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Verification Report

MGM Carbon Portfolio S.a.r.l.

4th Periodic Verification of the Registered CDM Project
“Sasol Nitrous Oxide Abatement Project”
in South Africa

UNFCCC 0961-CDMP

Monitoring period #4: 04-08-2009 to 09-09-2010

Report No. 600500604

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TÜV SÜD Industrie Service GmbH
Carbon Management Service
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Report No.	Date of first issue	Version:	Date of this revision
600500604	11-05-2012	04	14-11-2012
Subject:		Fourth Periodic Verification	
Executing Operational Unit:			
TÜV SÜD Industrie Service GmbH, Carbon Management Service Westendstrasse 199 - 80686 Munich, Federal Republic of Germany			
Project Participants:			
MGM Carbon Portfolio S.a.r.l. (5, rue Guillaume Kroll, L-1882 Luxemburg) – (client) Sasol Nitro (Nitrogen Road, Secunda, 2302, Mpumalanga, Republic of South Africa) Sasol Financing (Pty) Limited			
Registration number / Project Title			Project 0961: “Sasol Nitrous Oxide Abatement Project”
Monitoring period:			04-08-2009 to 09-09-2010
First Monitoring Report (version/date)			Version 1.0 / 09-03-2011
Final Monitoring Report (version/date)			Version 3.3 / 13-11-2012
Summary:			
TÜV SÜD Industrie Service GmbH has performed the 4 th periodic verification of the registered CDM project: “Sasol Nitrous Oxide Abatement Project”. The project consists of the second catalyst installed to decompose N2O and AMS, Automated Measuring System to monitor the amount of N2O in the tail gas individually at 2 nitric acid plants in South Africa. Sasol Nitro as well as MGM Carbon Portfolio S.a.r.l. are responsible for the preparation of the GHG emissions data and the reported GHG emission reductions. A document review, followed by a site visit was conducted to verify the information submitted by the project participant regarding the present verification period. Based on the assessment carried out, the verifier confirms the following:			
- the project has been implemented and operated in accordance with the description given in the registered PDD (version 5, 31/01/2007, registration date 25/05/2007). - the project is implemented to create emission reductions in verifiable way in accordance with the monitoring plan described in PDD. - the monitoring plan complies with the applied methodology (AM0034 version 02) and the monitoring has been carried out in accordance with the monitoring plan.			
The verifier can confirm that the GHG emission reductions are calculated without material misstatements. Our opinion refers to the project's GHG emissions and resulting GHG emission reductions reported, both determined using the valid and registered project's baseline, its monitoring plan and its associated documents.			
Based on the information we have seen and evaluated, we confirm that the implementation of the project resulted in 666,683 t CO ₂ e of emission reductions during the verification period from 04/08/2009 to 09/09/2010.			
Assessment Team Leader: Yutaka Yoshida Assessment Team Members: Martin Hammer			Technical Reviewers: Javier Castro Certification Body responsible: Thomas Kleiser



Abbreviations

AM	Approved Methodology
AMS	Automated Measuring System as defined in AM0034
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CDM-EB	CDM Executive Board
CER	Certified Emission Reduction
CMP	Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol
CO₂e	Carbon dioxide equivalent
CR / CL	Clarification Request
DNA	Designated National Authority
DOE	Designated Operational Entity
EF	Emission Factor
EIA / EA	Environmental Impact Assessment / Environmental Assessment
EMS	Environmental Management system, typically in accordance with ISO14001
ER	Emission Reduction
FAR	Forward Action Request
GHG	Greenhouse Gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
IRL	Information Reference List
KP	Kyoto Protocol
MGM	MGM Carbon Portfolio S.a.r.l.
MP	Monitoring Plan
MR	Monitoring Report
PDD	Project Design Document
QMS	Quality Management System, typically in accordance with ISO9001
SASOL	Sasol Nitro, a Division of Sasol Chemical Industries Limited.
PP	Project Participant
TÜV SÜD	TÜV SÜD Industrie Service GmbH
UNFCCC	United Nations Framework Convention on Climate Change
VVM	Validation and Verification Manual

Main Documents (referred to in this report)

Methodology (name / version)	“Catalytic reduction of N ₂ O inside the ammonia burner of nitric acid plants” (AM0034, version 02)	
Scope	5	
Technical Area	5.1	
Registered PDD:	version 5, dated 31/01/2007	
Revised Monitoring Plan:	N/A	
	Version	Date
Published Monitoring Report	1.0	09-03-2011
Revised Monitoring Report	3.3	13-11-2012
Project documentation link:	http://cdm.unfccc.int/Projects/DB/DNV-CUK1171877538.97/view	

Table of Contents

Page

1	Introduction	4
1.1	Objective	4
1.2	Scope.....	4
1.3	GHG Project Description	4
2	Methodology.....	6
2.1	Verification Process.....	6
2.2	Verification Team	6
2.3	Review of Documents	6
2.4	On-site Assessment and follow-up Interviews	7
2.5	Quality of Evidence to Determine Emission Reductions	7
2.6	Resolution of Clarification and Corrective and Forward Action Requests	8
2.7	Internal Quality Control.....	8
3	Verification Results.....	9
3.1	FARs from Validation / Previous Verification	9
3.2	Project Implementation in accordance with the registered Project Design Document ...	9
3.3	Compliance of the Monitoring Plan with the Monitoring Methodology	9
3.4	Compliance of the Monitoring with the Monitoring Plan	9
3.5	Assessment of Data and Calculation of Greenhouse Gas Emission Reductions	17
4	Summary of Findings	18
5	Verification Statement	23

Annex 1: Verification Protocol

Annex 2: Information Reference List

Annex 3: Appointment Certificates



1 INTRODUCTION

1.1 Objective

MGM Carbon Portfolio S.a.r.l. has commissioned an independent verification by TÜV SÜD Industrie Service GmbH (TÜV SÜD) of its registered CDM project: “Sasol Nitrous Oxide Abatement Project”.

The objective of the verification work is to comply with the requirements of paragraph 62 of the CDM Modalities and Procedures. According to this assessment TÜV SÜD shall:

- ensure that the project activity has been implemented and operated as per the registered PDD “Sasol Nitrous Oxide Abatement Project” version 5, dated 31/01/2007, and that all physical features (technology, project equipment, monitoring and metering equipment) of the project are in place,
- ensure that the published MR and other supporting documents provided are complete, verifiable and in accordance with applicable CDM requirements,
- ensure that the actual monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan and the approved methodology,
- evaluate the data recorded and stored as per the “Catalytic reduction of N₂O inside the ammonia burner of nitric acid plants” (AM0034, version 02).

1.2 Scope

The verification scope encompasses an independent and objective review and ex-post determination of the monitored reductions in GHG emissions by the Designated Operational Entity. The verification is based on the submitted monitoring report, the validated project design documents including its monitoring plan and validation report, the previous verification reports, the applied monitoring methodology, relevant decisions, clarifications and guidance from the CMP and the EB and any other information and references relevant to the project activity's resulting emission reductions. These documents are reviewed against the requirements of the Kyoto Protocol, the CDM Modalities and Procedures and related rules and guidance.

Based on the requirements in the VVM, TÜV SÜD has applied a rule-based approach for the verification of the project. The principles of accuracy, completeness, relevance, reliability and credibility were combined with a conservative approach to establish a traceable and transparent verification opinion.

The verification considers both quantitative and qualitative information on emission reductions.

The verification is not meant to provide any consultancy towards the client. However, stated requests for clarifications, corrective and/or forward actions may provide input for improvement of the monitoring activities.

1.3 GHG Project Description

Project activity:	“Sasol Nitrous Oxide Abatement Project”
UNFCCC registration number:	0961
Project Participants:	MGM Carbon Portfolio S.a.r.l.; Sasol Nitro, a division of Sasol Chemical Industries Limited; Sasol Financing (Pty) Limited
Location of the project:	Sasolburg plant located in cnr Bunsen and Bergius street, Sasolburg 1974, (-26.825700°, 27.860150°), Free State, Republic of South Africa. Secunda plant located in Sasol Nitro, Nitrogen Road,

PERIODIC VERIFICATION

“Sasol Nitrous Oxide Abatement Project” (0961)

Page 5 of 23



Industrie Service

Secunda, 2302 (-26.591889°, 29.182164°), Mpumalanga,
Republic of South Africa.

Date of registration: 25/05/2007

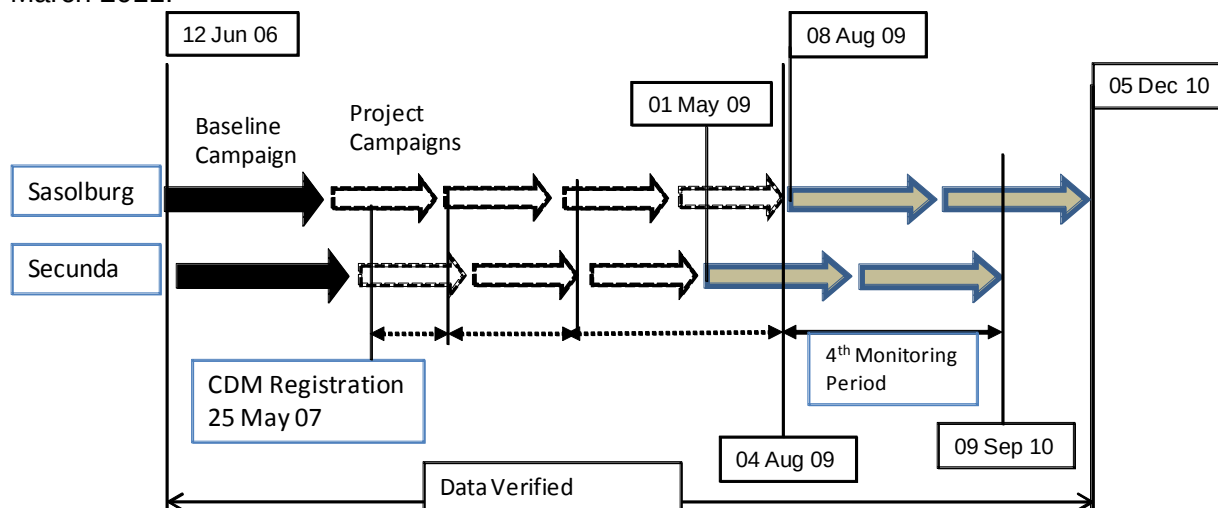
Starting date of the crediting period: 25/05/2007

The project activity involves the installation of a secondary catalyst to abate N₂O inside the ammonia burner once it is formed. Nitrous Oxide (N₂O) is an undesired by-product gas from the manufacture of nitric acid. Nitrous oxide is formed during the catalytic oxidation of Ammonia. Over a suitable catalyst, a maximum 98% (typically 92-96%) of the fed Ammonia is converted to Nitric Oxide (NO). The remainder participates in undesirable side reactions that lead to the production of Nitrous Oxide, among other compounds. Waste N₂O from nitric acid production is typically released into the atmosphere, as it does not have any economic value or toxicity at typical emission levels. N₂O is an important greenhouse gas which has a high Global Warming Potential (GWP) of 310.

As stated above, this project is to install the “additional” catalyst called the “secondary” catalyst which is dedicated to abate the concentration of N₂O in the tail gas. As it is not technically easy to make simultaneous measurement of N₂O concentration before & after such catalyst, i.e. baseline and project simultaneously, “baseline campaign” and “project campaigns” are separately done. Baseline Campaign is to be done without having secondary catalyst to determine “Baseline Emission Factor” (tN₂O/t100%HNO₃) which is supposed to be higher than one with the secondary catalyst. Then, Project Campaigns are to be done with secondary catalyst to determine “Project Emission Factor” (tN₂O/t100%HNO₃) which is supposed to be lower than “Baseline Emission Factor”. The difference will basically be “Emission Reductions” of each project campaigns in principle.

This project activity takes place at two nitric acid plants owned by Sasol Nitro, Sasolburg and Secunda respectively.

The project has been registered as CDM on 25 May 07 by UNFCCC. Prior to the registration at UNFCCC, the baseline campaigns had already been finished at both plants, from 12th June 2006 to 5th March 2007 at Sasolburg and from 29th August 2006 to 23rd March 2007 at Secunda. The first Monitoring Period was from the above day of CDM registration to 1st October 2007. And CERs have already been issued as a result of the last 3 periodic verification, i.e. the 1st & the 2nd & the 3rd periodic verification have already been finished. This 4th verification has been done for the 4th Monitoring Period from 04/08/2009 to 09/09/2010 since the 5th project campaigns at both plants have already been finished. Prior to starting this Verification, the Monitoring Report was made publicly available at UNFCCC webpage on 30th March 2011.



2 METHODOLOGY

2.1 Verification Process

The verification process is based on the approach depicted in the Validation and Verification Manual.

Standard auditing techniques have been adopted for the verification process. The verification team performs first a desk review, followed by an on-site visit, which results in the formation of a protocol that includes all the findings. The next step involves the evaluation of the findings through direct communication with the PPs and then finally the preparation of the verification report. This verification report and other supporting documents then undergo an internal quality control by the CB “climate and energy” before submission to the CDM-EB.

2.2 Verification Team

The appointment of the verification team takes into account the technical areas, sectoral scope and relevant host country experience required amongst team members for verifying the ER achieved by the project activity in the relevant monitoring period for this verification.

The CB TÜV SÜD operates the following qualification levels for team members that are assigned by formal appointment rules:

- Assessment Team Leader (ATL);
- Verifier (V);
- Verifier Trainee (T);
- Technical Expert (TE).

The verification team consisted of the following members:

Name	Qualification	Coverage of scope	Coverage of technical area	Coverage of financial aspect	Host country experience
Yutaka, Yoshida	ATL	☒	☒ (All)	-	☒
Hammer, Martin	V	☒	☒	☒	☒

Technical reviewer:

- Javier Castro

2.3 Review of Documents

The Monitoring Report version 01 submitted by the PP was made publicly available on the UNFCCC website before the verification activities started. The published MR was assessed based on all the relevant documents as listed above. The aim of the assessment in the desk review was to:

- verify the completeness of the data and the information presented in the MR,
- check the compliance of the MR with respect to the monitoring plan depicted in the registered PDD and verify that the applied methodology was carried out. Particular attention to the frequency of measurements, the quality of the metering equipment



including calibration requirements, and the quality assurance and quality control procedures was paid,

- evaluate the data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions.

A complete list of all documents reviewed is available in annex 2 of this report.

2.4 On-site Assessment and follow-up Interviews

On 19-21/04/2011 TÜV SÜD performed a physical site inspection at the both Secunda plant and Sasolburg plant, and on-site interviews with project stakeholders to:

- confirm the implementation and operation of the project,
- review the data flow for generating, aggregating and reporting the monitoring parameters,
- confirm the correct implementation of procedures for operations and data collection,
- cross-check the information provided in the MR documentation with other sources,
- check the monitoring equipment against the requirements of the PDD and the approved methodology, including calibrations, maintenance, etc.,
- review the calculations and assumptions used to obtain the GHG data and ER,
- identify if the quality control and quality assurance procedures are in place to prevent or correct errors or omissions in the reported parameters.

A list of the persons interviewed during this verification activity is included in annex 2.

2.5 Quality of Evidence to Determine Emission Reductions

Among several evidence items submitted, the following relevant and reliable evidence material have been used by the audit team during the verification process:

- QMS Documents prepared specifically for CDM activities including Overview Project Management, Responsibilities and document control procedures, List of measuring equipment and calibration frequencies, etc. for both Sasolburg and Secunda (IRL#22)
- Lists of monitoring equipment, specification (IRL#7)
- Internal/External Calibration Records (IRL#8, #9)
- Operation/Maintenance logs, Daily reports (IRL#13)
- Various data including raw data as well as supplemental data to support the justification on the integrity of the data and/or for cross-checking (IRL#14, #15, #16)
- External documents used to prove for few parameters, e.g. gauze composition (IRL #16)
- Historic data/records/documents applied to determine caps or for applicability (IRL#18, #19)

Sufficient evidence covering the full verification period in the required frequency is available to validate the figures stated in the final MR. The source of the evidence will be discussed in chapter 3 of this report. Specific cross-checks have been done in cases that further sources were available. The monitoring report's figures were checked by the audit team against the raw data. The data collection system meets the requirements of the monitoring plan as per the methodology.



2.6 Resolution of Clarification and Corrective and Forward Action Requests

The objective of this phase of the verification process is to resolve any outstanding issues which require clarification for TÜV SÜD's positive conclusion of the achieved GHG emission reduction. The findings raised as Forward Action Requests (FARs) indicated in previous reports (validation) were discussed during this phase and, issues raised in the FARs were resolved, during communications between the PP and TÜV SÜD.

Concerns raised in the desk review, the on-site audit assessments and the follow up interviews and the responses provided for the raised concerns are documented in Annex 1 (verification protocol) to guarantee the transparency of the verification process.

A Corrective Action Request is raised where TÜV SÜD identifies:

- non-conformities in monitoring and/or reporting with the monitoring plan and/or methodology;
- that the evidence provided is not sufficient to prove conformity;
- mistakes in assumptions, data or calculations that impair the ER;
- FARs stated during validation that are not solved until the on-site visit.

A Clarification Request is raised where TÜV SÜD does not have enough information or the information is not clear in order to confirm a statement or data.

A Forward Action Request is raised where TÜV SÜD identifies that monitoring and/or reporting require special attention or adjustments for the next verification period.

Information or clarifications provided as a response to a CAR, CL or FAR could also lead to a new CAR.

2.7 Internal Quality Control

As a final step of verification, the final documentation including the verification report and annexes have to undergo an internal quality control by the Certification Body (CB) “climate and energy”, i.e. each report has to be finally approved either by the Head of the CB or the Deputy. In case one of these two persons is part of the assessment team, the approval can only be given by the person who is not a part of the assessment team. If the documents have been satisfactorily approved, the Request for Issuance is submitted to the CDM-EB along with the relevant documents.



3 VERIFICATION RESULTS

In the following sections, the results of the verification are stated. The verification results relate to the project performance as documented and described in the registered PDD (version 5, 31/01/2007, registration date 25/05/2007) and Monitoring Report Version 3.1, dated 07/07/2012. The verification findings for each verification subject are presented below:

3.1 FARs from Validation and the previous Verifications

No FAR was raised in the validation report and previous verification reports <http://cdm.unfccc.int/Projects/DB/DNV-CUK1171877538.97/view>, and the verification team identified no material missing steps.

3.2 Project Implementation in accordance with the registered Project Design Document

The project is fully implemented according to the description presented in the registered PDD. The verifier confirms, through the visual inspection that all physical features of the proposed CDM project activity including data collecting systems and storage have been implemented in accordance with the registered PDD. The project activity is completely operational and the same has been confirmed on-site.

3.3 Compliance of the Monitoring Plan with the Monitoring Methodology

The monitoring plan is in accordance with the approved methodology, AM0034, version 02, applied by the proposed CDM project activity. Neither a revision nor a deviation to the monitoring plan has been requested to the CDM Executive Board.

3.4 Compliance of the Monitoring with the Monitoring Plan

The monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD. All parameters were monitored and determined as per the Monitoring Plan.

The verification of the parameters required by the monitoring plan is provided as follows:

Parameters based on metering devices are monitored by calibrated equipments in accordance with the procedures established as a part of Quality Management System for CDM monitoring activities, identified like SSBCDM-xxxx (e.g. IRL 7a) at Sasolburg and SECCDM-xxxx (like IRL 7c) at Secunda.

At Sasolburg, all CDM data are monitored continuously on the DeltaV Distributed Control System (DCS) by production personnel in the Control Room. The Instrument Engineer is responsible for the AMS, data gathering and report generation. Primary data storage is done in a PI database, which form an integral part of the DCS system, at two second intervals. Data are stored in batches of about six days, with only the last five months data continuously available on the DCS.

Scheduled backups of the last four batch files are made on a CD every 24 days and stored in a fireproof safe at the Ammonia plant. This data must be restored on the originating PI database before the data can be viewed or interrogated. With the completion of a campaign, data will be transferred from backup CD's to a DVD to minimize space requirements in the fireproof safe.



Data are also stored at 30 second intervals in a secondary database which form part of the Sasol Local Area Network and can be viewed from any LAN point. This second database can also be used for reporting should there be a major failure of the primary database

At Secunda, all CDM data are monitored continuously on the remote located PC (in the plant control room) via the SCADA INTOUCH and ACTIVE FACTORY software package by production personnel in the Control Room. The PC has access rights to the DAS server computer where the raw data from the instruments is written on a continuous basis. The Area Leader/Manager Maintenance - Engineer will be responsible for the AMS, data gathering and report generation. A daily summary report of hourly average data is generated by the DAS and a unique file is written to the common disk drive (analyzer Z:\) every morning at 05:00AM from where it can be viewed by selected personnel only, in this case the Monitoring Engineer and the Plant production Area leader. This file is safeguarded as read only and cannot be modified or changed as only the third party consultant who developed the DAS and AMS has the password to bypass the safeguarding and access the file for modification. All raw data written to the server hard disk drives, which are setup up using five identical hard disk drives in parallel service is available at any time and can be written to DVD format and forwarded to any party concerned.

Data / Parameter:	Volume Flow Rate of the Stack in the Baseline Measurement Period, VSG
Data unit:	Nm ³ /hour
Description:	Mean gas volume flow rate in the stack gas
Source of data used:	Volume flow rate of the stack gas is continuously measured with Rosemount 485 Annubar a pressure differential type gas flow meter at Secunda and an ultrasonic type Flowsick 100 at Sasolburg and is continuously recorded on DCS/DAS.
Means of verification/Comments:	To comply with EN14181 (2004,) QAL2 and ASTs were successfully done since 15-21 February 2007 by an accredited laboratory SGS Environmental Service. UNC as the total (combined) uncertainty on AMS at Sasolburg has been determined to be +/-3.89% at Sasolburg and +/-4.14% at Secunda in the 1st QAL2 report. In addition, AST was successfully done by SGS in 08-12 August 2008 and 27-29 August 2009 and these AST reports explicitly confirm that the previous QAL2 result has still been maintained and that the current QA/QC procedures implemented complies with EN14181. i.e. The purpose of ASTs were successfully fulfilled and the conformance with EN14181 maintained has been confirmed by the accredited laboratory. From 16-19 August 2010 the 2nd QAL2 has been performed. Hence PPs applied the procedure determined in EB52 Annex 60 to all NCSG and VSG data from QAL2 expiring until 2nd QAL2. The verifier has reviewed the Excel calculation tool and found the permissible error of VSG and NCSG conservatively applied. As checked by the verifier, applying the permissible error results in a higher EFp than applying the new QAL2 parameters to data in question. Hence the verifier can confirmed that EB 52 Annex 60 is correctly applied. All QAL2 and AST services were done by SGS. Since SGS as QAL2/AST provider is neither the validator nor the verifier, there is no conflict to the decision of CDM EB stated at the paragraph 13 in EB33 report. The measured data are automatically converted to the normalized data at 0 °C, 0.101Mpa (standard atmospheric pressure) with the real-time conversion incorporated in the pressure transmitter at Secunda and the algorithm incorporated in DCS at Sasolburg. This algorithm/function used to make the real time conversion with temperature and pressure data are verified with the specification documents (IRL #6, #7). In addition, QAL2/AST were done with the normalized data between these flow meters installed at both plants and



	the reference flow meter temporarily installed by SGS. The verifier has verified the integrity and the consistency of the series of the hourly data from various point of view, e.g. with the graphical analysis and the comparison among them, checks on the data processing/algorithm incorporated, checks on the default/maximum/minimum/average values applied, cross checking with other reports, the compliance to MP and AM0034, etc. For an instance, abnormal data, i.e. data measured during the time period which is and can be considered as “AMS downtime” have correctly been converted to conservative values in accordance with AM0034, e.g. lowest between the last measured and the conservative IPCC default for baseline campaign and the highest value for the entire length of a project campaign. The verifier has concluded that the data and the result are sufficiently reliable and comply with the applied methodology as well as the monitoring plan stated in PDD registered. In addition, in accordance with QAL2 report, the flow rate is calculated on dry basis on the fixed and conservative assumption that the moisture contents would always be 2% in the tail gas, while actual moisture contents was also stated “very low” in the QAL2 report so that the verifier can consider the 2% assumption conservative.
Cross-check	In order to ensure the integrity of the data, the verification team reviewed the series of hourly data in parallel with other parameters including to make a graph with the Excel file calculation sheet submitted. And there was no abnormality found as a result.

Data / Parameter:	Temperature of the Stack Gas, TSG
Data unit:	°C
Description:	Temperature of the stack gas
Source of data used:	TSG is measured with thermocouple type K at Sasolburg and Pt100 at Secunda, incorporated in the tail gas flow meter.
Means of verification/Comments:	As QAL2 and AST are done on the normalized data, this element has been maintained together with VSG and PSG. The recording frequency of every 2 seconds is verified with the real-time raw data displayed on the screen when the verifier visited the plants.
Cross-check	Graphical check was done on VSG data and no abnormality was found.

Data / Parameter:	Pressure of the Stack Gas, PSG
Data unit:	kg/cm ²
Description:	Pressure in the stack gas
Source of data used:	PSG is measured with a pressure sensor, measuring the static pressure of the tail gas, incorporated in the tail gas flow meter at Secunda..
Means of verification/Comments:	As QAL2 and AST are done on the normalized data, this element has been maintained together with VSG and TSG. The recording frequency of every 2 seconds is verified with the real-time raw data displayed on the screen when the verifier visited the plants.
Cross-check	Graphical check was done on VSG data and no abnormality was found. In addition, although these values were small compared to the standard atmospheric pressure is 0.101 MPa, they are not considered abnormal as both Sasolburg and Secunda are located in highland.

Data / Parameter:	N ₂ O Concentration in the Stack Gas, NCSG
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Data unit:	mg N ₂ O/Nm ³ (converted from ppm if necessary)
Description:	Mean concentration of N ₂ O in the stack gas
Source of data used:	At both Sasolburg and Secunda plants, N ₂ O concentration in the stack gas is continuously measured with ABB AO2000-URAS 14, a QAL 1 certified infrared gas analyser and is continuously recorded on DCS/DAS.
Means of verification/Comments:	To comply with EN14181(2004), QAL2 and ASTs were successfully done since 15-21 February 2007 by an accredited laboratory SGS Environmental Service. UNC as the total (combined) uncertainty on AMS at Sasolburg has been determined to be +/-3.89% at Sasolburg and +/-4.14% at Secunda in the 1st QAL2 report. In addition, AST was successfully done by SGS in 08-12 August 2008 and 27-29 August 2009 and these AST reports explicitly confirm that the previous QAL2 result has still been maintained and that the current QA/QC procedures implemented complies with EN14181. i.e. The purpose of ASTs were successfully fulfilled and the conformance with EN14181 maintained has been confirmed by the accredited laboratory. From 16-19 August 2010 the 2nd QAL2 has been performed. Hence PPs applied the procedure determined in EB52 Annex 60 to all NCSG and VSG data from QAL2 expiring until 2nd QAL2. The verifier has reviewed the Excel calculation tool and found the permissible error of VSG and NCSG conservatively applied. As checked by the verifier, applying the permissible error results in a higher EFp than applying the new QAL2 parameters to data in question. Hence the verifier can confirmed that EB 52 Annex 60 is correctly applied. All QAL2 and AST services were done by SGS. Since SGS as QAL2/AST provider is neither the validator nor the verifier, there is no conflict to the decision of CDM EB stated at the paragraph 13 in EB33 report. QAL3, particularly Zero/Span check on N₂O analyzer has punctually been maintained. For the periods where the regular Zero/Span check were exceeding the QAL3 limit, "Guidelines for assessing compliance with the Calibration Frequency Requirements, version 01 (Annex 60, EB52)" have been correctly applied.
Cross-check	In order to ensure the integrity of the data, the verification team reviewed the series of hourly data in parallel with other parameters included to make a graph with the Excel file calculation sheet submitted. Although there were additional fluctuation of NCSG observed in the 4 th project campaign at Secunda, it was settled after the repair of Lamont boiler (AOR) done on 09-10 Sep. 2009. And thus, these fluctuated values are considered real as QAL3 implementation was also sound.

Data / Parameter:	Operating Hours, OH
Data unit:	Hour
Description:	Total operating hours for a campaign
Source of data used:	While the applied methodology specifies "production log" and "daily" for this parameter, Sasol uses one determined based on the measured data as the source to be precise. I.e. Sasol is counting hours in which the hourly average of the reactor temperature is above 650 °C during each campaigns. On the other hand, Sasol continues to maintain a hand writing operation log which is to be used for cross checking purpose in case of any unexpected failure on the data logging system.
Means of verification/Comments:	OH values have been determined sufficiently in transparent and conservative way in the spreadsheet and there was no inconsistency found in comparison to the information recorded in operation logs.



Cross-check	The graphs of daily HNO ₃ production were compared to the graphs of other parameters, e.g. NH ₃ supplied to check the similarity.
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Data / Parameter:	Overall Uncertainty of the Monitoring System, UNC
Data unit:	%
Description:	Overall uncertainty of the monitoring system, calculated as the combined uncertainty of the applied monitoring equipment
Source of data used:	Measured by QAL2 test
Means of verification/Comments:	UNC as the total (combined) uncertainty on AMS at Sasolburg has been determined to be +/-3.89% at Sasolburg and +/-4.14% at Secunda in the 1 st QAL2 report valid for the baseline campaign and correctly applied to determine EFBL.
Cross-check	In opinion of the assessment team reported value is in the usual range of UNC of such AMS systems.

Data / Parameter:	Nitric Acid Production, NAP
Data unit:	tonne 100% HNO ₃
Description:	Total nitric acid production for a campaign
Source of data used:	The total amount of nitric acid (100% concentrated) produced during baseline campaigns and project campaigns, using Coriolis type mass flow meters at both plants, promass 83 at Secunda and Micro Motion at Sasolburg, in addition to daily concentration measurement at internal laboratories.
Means of verification/Comments:	The daily amount of nitric acid produced have been submitted in the CERS calculation spreadsheets so that the verifier could check the consistency compared to the other related parameters, e.g. ammonia input as mentioned below. The total nitric acid production during the 5th and the 6th project campaign at Sasolburg were 135,307 t100%HNO₃ and 111,160 t100%HNO₃. During this monitoring period from 04/08/2009 to 09/09/2010, the total nitric acid produced was 200,613 t100%HNO₃ (=135,307+65,306) which is equivalent to 504 t100%HNO₃/day and apparently less than the design capacity 557 t100%HNO₃/day as the applicable limit at Sasolburg. With regard to Secunda, the total nitric acid production during the 4th and the 5th project campaign were 196,248 t100%HNO₃ and 161,821 t100%HNO₃. During this monitoring period from 04/08/2009 to 09/09/2010, the total nitric acid produced was 303,766 t100%HNO₃ (=141,945+161,821) which is equivalent to 756 t100%HNO₃/day and apparently less than the design capacity 860 t100%HNO₃/day at Secunda.
Cross-check	These values are cross-checked by Sasol with the data from other sources, i.e. the production balance data based on storage tank level measurement and delivery data from the weighbridges. These cross-check data are reviewed daily and monthly in the reports to monitor the production results and the production efficiency as one of Sasol's usual activities. In addition to this cross-checking data/reports, the verifier has also checked the shape of the graphs in comparison to one of ammonia supply and N ₂ O data in order to ensure the consistency and the integrity.

Data / Parameter:	N ₂ O Emission Factor, EF
Data unit:	tonne N ₂ O/tonne 100% HNO ₃



Description:	The emission factor is calculated from monitored data for a campaign.
Source of data used:	Calculated from monitored data
Means of verification/Comments:	This has been calculated based on the measured data of applicable parameters. The elimination of N₂O data in relation to the permitted operating range, the elimination of the data that lie outside the 95% confidence interval, the application of AMS downtime and UNC determined based on QAL2 report have been correctly applied in the Excel file (IRL #14) Since CDM Executive Board published the new decision to clarify the way of the re-calculation of the baseline emission factor in relation to the length of campaigns in Annex 12 of EB51 report, the baseline emission factor for the 5th project campaign at Secunda and 6th project campaign at Sasolburg have been recalculated to comply with it. In addition, the requirements about moving average in AM0034 have correctly been applied.
Cross-check	N/A

Data / Parameter:	Oxidation Temperature for Each Hour, OT _h
Data unit:	°C
Description:	Oxidation temperature of the ammonia reactor for each hour
Source of data used:	Oxidation temperature is continuously measured with thermo-couples and transducer, ENDRESS & HAUSER iTEMP TMT 181 at Sasolburg and Honeywell ST3000 at Secunda.
Means of verification/Comments:	To comply with the requirement of the methodology applied, hourly data have been provided in the calculation spreadsheets and the range of variation during baseline campaign has been analyzed comparing to permitted operating conditions determined based on the historic data at Sasolburg and based on the specification at Secunda (IRL #18, #19) as mentioned about operating conditions below. For project campaigns, this parameter is not required to be monitored in AM0034 version 2 while the series of hourly data as the monitoring results have been submitted in the spreadsheets of each project campaign.
Cross-check	As mentioned above, the verification team reviewed the series of hourly data in parallel with other parameters including to make graphs with the Excel file calculation sheet submitted. There was no abnormality found.

Data / Parameter:	Oxidation Pressure for Each Hour, OP _h
Data unit:	Pa abs
Description:	Oxidation pressure of the ammonia reactor for each hour
Source of data used:	Oxidation pressure is continuously measured with the pressure transducers, Rosemount Smart pressure transmitter model 3051 at Sasolburg and Honeywell ST3000 at Secunda.
Means of verification/Comments:	To comply with the requirement of the methodology applied, hourly data have been provided in the calculation spreadsheets and the range of variation during baseline campaign has been analyzed comparing to permitted operating conditions determined based on the specification at both plant (IRL #18, #19) as mentioned about operating conditions below. For project campaigns, this parameter is not specified to be monitored in AM0034 version 2 while the series of hourly data as the monitoring results have been submitted in the spreadsheets of each project campaign.
Cross-check	As mentioned above, the verification team reviewed the series of hourly data



	in parallel with other parameters including to make graphs with the Excel file calculation sheet submitted. There was no abnormality found.
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Data / Parameter:	Ammonia Gas Flow Rate to AOR, AFR
Data unit:	kg NH ₃ /hour
Description:	Ammonia flow rate to the ammonia oxidation reactor for the baseline campaign
Source of data used:	Ammonia gas flow rate to the AOR is continuously measured with orifice and the differential pressure transmitter, Rosemount 3051 at Sasolburg and Honeywell ST3000 at Secunda, calibrated annually.
Means of verification/Comments:	To comply with the requirement of the methodology applied, hourly data have been provided in the calculation spreadsheets and the range of variation during baseline campaign has been analyzed comparing to permitted operating conditions determined based on the specification of the gauze at both plants (IRL #14). For project campaigns, this parameter is not specified to be monitored in AM0034 version 2 while the series of hourly data as the monitoring results have been submitted in the spreadsheets of each project campaign.
Cross-check	As mentioned above, the verification team reviewed the series of hourly data in parallel with other parameters including making graphs with the Excel file calculation sheet submitted, especially to compare with nitric acid production. There was no abnormality found.

Data / Parameter:	Ammonia to Air Ratio, AIFR
Data unit:	(kg NH ₃ /kg air)
Description:	Ammonia to air flow ratio to the ammonia oxidation reactor for the baseline campaign
Source of data used:	Air flow to the mixer is continuously measured with Rosemount Annubar at Sa-solburg and orifice/Honeywell ST 3000 at Secunda, calibrated annually.
Means of verification/Comments:	To comply with the requirement of the methodology applied, hourly data have been provided in the calculation spreadsheets and the rate AFR divided by hourly air flow is provided in an additional column. And the range of variation during baseline campaign has been analyzed comparing to permitted operating conditions determined based on the specification of the gauze at both plants (IRL #18, #19) as mentioned about operating conditions below. For project campaigns, this parameter is not specified to be monitored in AM0034 version 2 while the series of hourly data as the monitoring results have been submitted in the spreadsheets of each project campaign.
Cross-check	As mentioned above, the verification team reviewed the series of hourly data in parallel with other parameters including making graphs with the Excel file calculation sheet submitted. There was no abnormality found.

Data / Parameter:	Campaign Length for Baseline Campaign, CL
Data unit:	tonne 100% HNO ₃
Description:	Campaign length is defined as the total number of tonnes of nitric acid at 100% concentration produced with one set of gauzes (see nitric acid production, NAP).
Source of data used:	The same as NAP. The total amount of nitric acid (100% concentrated) produced during baseline campaigns and project campaigns, using Coriolis



	type mass flow meters at both plants, promass 83 at Secunda and Micro Motion at Sasolburg, in addition to daily concentration measurement at internal laboratories.
Means of verification/Comments:	The normal campaign lengths verified at the previous verification are 114,727 t100%HNO ₃ at Sasolburg and 183,602 t100%HNO ₃ at Secunda. 5 th project campaign at Secunda and 6 th project campaign at Sasolburg were shorter than the normal campaign length. Therefore, the baseline emission factors for those campaigns have correctly been re-calculated to comply with both the applied methodology and Annex 12 of EB51 report.
Cross-check	These values are cross-checked by Sasol with the data from other sources, i.e. the production balance data based on storage tank level measurement and delivery data from the weighbridges. These cross-check data are reviewed daily and monthly in the reports to monitor the production results and the production efficiency as one of Sasol's usual activities. In addition to this cross-checking data/reports, the verifier has also checked the shape of the graphs in comparison to one of ammonia supply and N ₂ O data in order to ensure the consistency and the integrity.

Data / Parameter:	Gauze Supplier, GS
Data unit:	N/A
Description:	Gauze supplier
Source of data used:	purchasing documents (IRL #16) issued by Heraeus SA (PTY) Ltd
Means of verification/Comments:	No change since historic campaigns. The historically used gauze composition has been confirmed with the letters named “Precious Metal Contents” sent from Heraeus in 2006. And the continuation of using the same products have been verified with the purchasing documents (IRL #16) issued by Heraeus SA (PTY) Ltd. every camapigns in which the specification including the name of the products and the weight % of the platinum, Rhodium and Palladium are explicitly indicated.
Cross-check	Crosschecked with internet research. Several documents found that mentions Heraeus as gauze supplier for Sasol Nitro in South Africa (e.g. IRL 16f)

Data / Parameter:	Gauze Composition, GC
Data unit:	% precious metals (platinum, rhodium)
Description:	Gauze composition
Source of data used:	Purchasing documents (IRL #16) issued by Heraeus SA (PTY) Ltd
Means of verification/Comments:	No change since historic campaigns. The historically used gauze composition has been confirmed with the letters named “Precious Metal Contents” sent from Heraeus in 2006. And the continuation of using the same products have been verified with the purchasing documents (IRL #16a) issued by Heraeus SA (PTY) Ltd. every camapigns in which the specification including the name of the products and the weight % of the platinum, Rhodium and Palladium are explicitly indicated.
Cross-check	Crosschecked with internet research. Several documents found that mentions Heraeus as gauze supplier for Sasol Nitro in South Africa (e.g. IRL 16f)

Data / Parameter:	Emission Level Set by Incoming Policies or Regulations, EF _{reg}
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Data unit:	kg N ₂ O/tonne HNO ₃
Description:	Local and national regulations on N ₂ O and NO _x emissions
Source of data used:	Local and national regulations
Means of verification/Comments:	No applicable legislative requirement introduced in the host country. This complies with the knowledge and experience of the verification team.
Cross-check	This complies with the sectoral knowledge of the audit team.

3.5 Assessment of Data and Calculation of Greenhouse Gas Emission Reductions

Quality assurance procedures are in place and operational. All involved staff is trained and made aware of the quality assurance procedures.

Sasol has described key positions and roles in the applicable QMS documentation, typically in “Description of personnel involved in the CDM Project activities, SSBCDM-0010” for Sasolburg and “People involved in the CDM project activities at the plant, SECCDM-0005” for Secunda. These procedures include organization charts indicating hierarchical responsibilities from Plant Operator or from Area Managers to Senior Management or to Shareholders for Sasol, as well as descriptions about such responsibilities.

As raw data is automatically logged in the data acquisition system (hereinafter called “DAS” or “DCS”), plant operators or area managers are to supervise such system in cooperation with monitoring engineers. At both plants, Monitoring engineers have some administrative tasks like entering data into spread sheets and cross checking. The lists of key monitoring equipment for CDM activities have been established to ensure the conformance with the plan, and calibration is carried out and reported in a part of overall QMS certified with ISO 9001.

As a partner for this CDM project, MGM is supposed to be a “Project Developer” which is stated in above procedures, and is to receive above spread sheets from Sasol to process the data measured, to calculate and finally to issue a monitoring report.

The verification team reviewed the CERs calculation spreadsheet in Excel files provided by MGM which is the final outcome to determine the baseline and project emissions. These Excel files consists of both raw and “processed” hourly and daily data, so that the verification team could easily check how raw data were processed and easily create graphs to see the graphical overview.

As result, the verifier has had the confidence that the CERs calculation spreadsheet provides correct ways of treating data in very transparent manner, including the treatment related to “AMS downtime”, determination of emission factors, re-calculation of baseline emission factor, ERs calculation, cap with moving average.

With regard to the comparison of ERs verified and estimated in PDD, the annual average emission reductions estimated in PDD registered, version 5 from 31/01/2007 are 515,837 tCO₂e/year at Sasolburg, 444,485 tCO₂e/year at Secunda and 960,322 tCO₂e/year in total. Compared, 666,683 tCO₂e has been achieved for this monitoring period from 04-08-2009 to 09-09-2010, for about 1 year an 1 month.

Therefore Sasol has made approx. 70% of the estimated annual ERs, approx. 91% at Sasolburg and approx. 31% at Secunda. One of the main reasons observed by the verifier is very poor and unstable performance of the secondary catalyst at Secunda as there were periods where N₂O concentration was kept very high mainly due to alignment problems.



4 SUMMARY OF FINDINGS

The verifier can confirm that the published MR and related documents are complete and verifiable in accordance with the CDM requirements. All the findings including 5 CARs and 8 CRs raised by the verification team, the responses by the PPs and the conclusion from the team are presented in Annex 1. The means of verification and resulting changes in the MR or related documents are identified in the following table:

CAR 1: In August 2010 a new QAL 2 has been performed. However, the new QAL2 parameters were not found to be implemented for Sasolburg. Please provide a revised emission reduction calculation tool and a revised MR.
CAR 1, means of verification The audit team reviewed the revised Excel calculation tool "Sasolburg Sixth project campaign-7May 2010 to 9 Sep 2010- ver 2.0. xls" with special focus on the applied QAL2 parameters.
CAR 1, changes in the MR or related documents The new QAL 2 parameters were found to be implemented from 16th of August 2010. The third party institute conducted reference measurement on 16th of August for N2O analyser and flow meter at Sasolburg. Hence the date is found to be correct. Moreover the applied parameters were also found to consistent with the QAL2 report.
CAR 2: According the EB54 Annex34 the calibration frequency and last calibration date for each monitoring instrument shall be reported in the MR. Currently the MR includes the last calibration date before the end of the monitoring period. However, this date is not eligible to show compliance with the calibration frequency. Hence, it is required to state the last calibration date before the start the monitoring period and all dates for calibrations done within the monitoring period. Please correct the MR and provide a complete set of all relevant calibration certificates.
CAR 2, means of verification The verification team reviewed the revised Monitoring Report (IRL 1e) with special focus on the reported calibration dates for NCSG, VSG, TSG, PSG. Exact QAL2 and AST dates are reported for those parameters, Consistency was confirmed by reviewing the relevant QAL2 and AST reports (IRL 9a, IRL 9d, IRL 9e and IRL 9f). The parameters AFR and AIFR required to determine the baseline emission factor. Hence those measuring equipments have not an impact on the claimed emission reductions.
CAR 2, changes in the MR or related documents 2nd QAL2 was performed overdue. Hence PPs applied the procedure determined in EB52 Annex 60 from QAL2 expiring until next QAL2 for NCSG and VSG data. The verifier has reviewed the Excel calculation tool and found the permissible error of VSG and NCSG conservatively applied. As checked by the verifier, applying the permissible error results in a higher EFp than applying the new QAL2 parameters to data in question. Hence the verifier can confirmed that EB 52 Annex 60 is correctly applied.



CAR 2, means of verification and changes in the MR or related documents – after INCOMPLETE from 09th November 2012

The verifier has reviewed the revised Excel calculation tool (IRL 14u) with special focus on the formula used to apply the permissible error of VSG and NCSG. As checked by the verifier, the mistake in the formula has been corrected and the permissible error of VSG and NCSG is conservatively applied according to EB52 Annex 60 from QAL2 expiring until next QAL2 for NCSG and VSG data. Moreover the values in the revised MR (IRL 1g) were found to be consistent with the Excel calculation tool (IRL 14u).

CAR 3:

According the EB54 Annex34 information regarding the actual operation of the project activity during this monitoring period, including information on special events, for example overhaul times, downtimes of equipment, exchange of equipment, etc. shall be reported in the MR in section B.1. Please improve this section in the MR as e.g. there was no information found that would explain the fluctuations of N2O concentration in Secunda especially in project campaign #04.

CAR 3, means of verification

The audit team reviewed revised MR with special focus on section B.1.

CAR 3, changes in the MR or related documents

Information regarding the actual operation of the project activity during this monitoring period, including information on special events has been included. Additionally the alignment problem of N2O catalyst which was explained to be the reason of increased N2O concentration has been reported here.

CAR 4:

Span checks were found to be out of limit in Secunda in the Shewhart chart but no correction of data was found to be done. Please clarify the procedure which is applied in events when zero or span checks are found to be out of limit and apply this procedure to all such events.

CAR 4, means of verification

The verification team reviewed the revised Excel Calculation Tools (IRL 14m-p) with special focus on data handling due to QAL3 out of allowed limits.

CAR 4, changes in the MR or related documents

Hence NCSG values were found to conservatively treated.

CAR 5:

Sasolburg: In the Excel Calculation Tools spreadsheet "Hourly Average" an incorrect unit for the hourly stack flow was found. Please correct all spreadsheets.

CAR 5, means of verification

The audit reviewed the Excel Spreadsheets for Sasolburg (IRL 14m and IRL 14n) with special focus on the unit for stack gas flow in spreadsheet "Hourly Average".

CAR 6, changes in the MR or related documents

The unit is found to be corrected.

CR 1: The CDM project is limited to the design capacity (nameplate) of the nitric acid plants.



Please clarify the compliance of the CERs generated in this monitoring period and provide a transparent statement in the MR to report this issue.

CR 1, means of verification

The audit team reviewed revised MR with special focus on section E.4.

CR 1, changes in the MR or related documents

A comparison between annual nameplate capacity and production over one year (365 days) were found. The nameplate capacity was verified against the Validation Report "The nameplate capacity for Secunda is 860 t 100% HNO₃ per day. The value of 290 000 t/year represent 92% operating time at the nameplate capacity. Sasolburg nameplate capacity is 556.8 t 100% HNO₃ per day. The value of 190 000 t/yr corresponds to 93.4% operating time at nameplate capacity."

The nameplate capacity was not exceeded.

CR 2:

Sasolburg: Please provide the certificate for test gas used for QAL3 span checks of the analyser in the period 26/08/2009 to 06/12/2010.

CR 2, means of verification

PP submitted the test gas certificate IRL 16d which has been reviewed. The span gas concentration is consistent with the value used in the Shewhart Charts IRL8a.

CR 2, changes in the MR or related documents

N/A

CR 3:

Please clarify the low N₂O concentration values in May 2009 after starting project campaign #04 in Secunda.

CR 3, means of verification

PPs submitted IRL 5c (Primary and Secondary Catalyst System Installation Report filename: "Sasol Secunda removal&replacement of primary&SC Apr09-CR3.doc" issued by Steve Evenwell (Production Manager) Heraeus dated on 30/04/2009). According to this document new catalyst material was filled before starting project campaign 4. Hence the low N₂O concentration became plausible.

CR 3, changes in the MR or related documents

N/A

CR 4:

Secunda: Please clarify calibration procedure for nitric acid flow meter and provide all relevant calibration certificates. Furthermore please clarify the validity of calibration of nitric acid flow meter as the MR states 1 year but different information was gained during onsite interviews. In case the information stated in MR needs to be corrected appropriate evidence must be submitted.

CR 4, means of verification

The verifier reviewed document IRL 7a "Secunda - Critical CDM instrumentation -list of parameters and frequency" including a description of calibration requirement for nitric acid flow meter, which is in compliance with response to CR04. Additionally PPs submitted calibration



recommendation from manufacturer (IRL9k) as evidence which has also been reviewed by the verifier. The verifier cross-checked the information with IRL 9j (Calibration Intervals Billing/Monitoring (Suggestions) issued from Endress+Hauser for flowmeters under different conditions). The calibration frequency was found to be in range of the recommendations from Endress+Hauser. A work order (IRL 9l) to confirm an instrument check dated in June 2009 has been provided. The calibration certificate of nitric acid flow meter serial number C200BD20000 dated on 20/02/2009 was submitted to the verifier.

The PDD defines: "...calibration and service intervals will be according to the manufacturer specifications..". Hence there is no need to revise the Monitoring Plan.

CR 4, changes in the MR or related documents

Calibration frequency of nitric acid flow meter at Secunda has been changed to 3 years.

CR 5:

Secunda and Sasolburg: Please clarify the calibration requirements of AFR flow meter, oxidation temperature and oxidation pressure instrument.

CR 5, means of verification

The verifier reviewed documents IRL 7a "Secunda - Critical CDM instrumentation -list of parameters and frequency" for Secunda and IRL 7b "Sasolburg-Instrument data & descriptions-parameters and frequency" for Sasolburg. The following information regarding calibration requirements for AFR flow meter, oxidation temperature and oxidation pressure instrument were found which are consistent with the reported information in the MR. Hence AFR is calibrated yearly in Sasolburg and every three years in Secunda, OTh and OPh are calibrated yearly in Secunda and Sasolburg.

CR 5, changes in the MR or related documents

N/A

CR 6:

Please provide transparent information on parameters and threshold values defining OH. Currently the MR includes only general information in Chapter D.2. in table "P.4 OH". Please provide individual information for Secunda and Sasolburg.

CR 6, means of verification

The verifier reviewed revised MR with special focus on Chapter D.2. in table "P.4 OH" and the calculation tools with special focus on OH determination. The information was found to be transparent. Individual values were implemented for Sasolburg and Secunda in the calculation tool. However, the plant status for Sasolburg campaign #06 defined in spreadsheet "Hourly Average" (plant online 4946h) is not consistent with reported OH in spreadsheet "Operating hours and production" (4949h) for Sasolburg campaign #06.

CR 6, changes in the MR or related documents

The operating hours for 3 days were found to be corrected in spreadsheet "Operating hours and production".

CR 7:

Secunda: Please provide a statement from nitric acid plant manufacturer on the purpose of the pipe between N2O concentration sample point and stack gas flow sample point as its purpose of emergency bypass of ammonia gas could not be completely evidenced onsite.



CR 7, means of verification
The verifier reviewed PPs response together with supporting documents (IRL 5d-e). Hence, the documents confirm the purpose of emergency bypass of ammonia gas of the pipe between N2O concentration sample point and stack gas flow sample point.
CR 7, changes in the MR or related documents
N/A

CR 8:
Secunda: Please provide the certificate of test gas used during second half of 5th project campaign with concentration of 1314ppm according to Shewhart Chart and the certificate of test gas used during first half of 4th campaign with concentration of 1080ppm according to Shewhart Chart.
CR 8, means of verification
The test gas certificates IRL 16d and IRL 16e submitted have been reviewed. The span gas concentrations are consistent with the values used in the Shewhart Charts IRL8b and IRL8c.
CR 8, changes in the MR or related documents
N/A



5 VERIFICATION STATEMENT

TÜV SÜD Industrie Service GmbH has performed the fourth periodic verification of the CDM project: “Sasol Nitrous Oxide Abatement Project”. The verification is based on the currently valid documentation of the UN Framework Convention on Climate Change (UNFCCC).

The management of Sasol and MGM are responsible for the preparation of the GHG emissions data and the reported GHG emission reductions on the basis set out within the project's Monitoring Plan indicated in the registered PDD version 5, dated 31/01/2007 and the applied methodology AM0034, version 02

The verifier can confirm that:

- the development and maintenance of records and reporting procedures are in accordance with the registered monitoring plan;
- the project is operated as planned and described in the project design document approved by the EB;
- the installed equipment being essential for generating emission reduction runs reliably and is calibrated appropriately;
- the monitoring system is in place and generates GHG emission reductions data;
- the GHG emission reductions are calculated without material misstatements;
- the monitoring plan in the approved PDD is as per the applied methodology.

Our opinion is based on the project's GHG emissions and resulting GHG emission reductions reported, which have been both determined through the valid and registered project's baseline, its monitoring plan and its associated documents.

Based on the information we have seen and evaluated, we confirm the following statement:

Reporting period: from 04-08-2009 to 09-09-2010

Verified emissions in the above reporting period:

Emission reductions: 666,683 t CO₂e

Munich, 14-11-2012

Munich, 14-11-2012

A handwritten signature in blue ink, appearing to read 'Thomas Klee'.

Certification Body “climate and energy”
TÜV SÜD Industrie Service GmbH

A handwritten signature in black ink, appearing to read 'Yutaka Yoshida'.

Yutaka Yoshida
Assessment Team Leader



Annex 1: Verification Protocol

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 1 / 57



Industrie Service

Table of Contents

1. Project Activity Implementation
 - 1.1. Technology
 - 1.2. Organization
 - 1.3. Quality Management System
 - 1.4. Outstanding FARs from previous Verifications (or forwarded issues from the validation report)
2. Monitoring Plan Implementation
 - 2.1. Parameters
 - 2.2. Parameters measured directly with instruments in the field
 - 2.3. Parameters measured through sampling
 - 2.4. Parameters obtained through external sources and accounting data
 - 2.5. Other parameters not included in the methodology/tool but included in the PDD
3. Data Processing and ER calculation
4. Additional assessment
 - 4.1. Internal Review
 - 4.2. Peculiarities
 - 4.3. Further additional requirements
 - 4.4. Data Reporting
5. Compilation and Resolutions of CARs, CRs and FARs

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 2 / 57



Industrie Service

1. Project Activity Implementation

1.1. Technology

Project Location (s)			
	PDD Description	Verification Findings(or Results?)	Conclusion and IRL
Site Description / Address:	The project activity is located at two nitric acid plants owned by Sasol. The smaller unit (557 tonne per day) is located in Sasolburg and the other nitric acid plant (860 tonne per day) in Secunda. Address: Sasolburg and Secunda, Free State and Mpumalanga provinces, Republic of South Africa	The location is correctly but just roughly stated in the PDD. The address is as follows. Sasolburg: cnr Bunsen and Bergius street Sasolburg 1974. Secunda: Sasol Nitro, Nitrogen Road, Secunda, 2302	☒ IRL #1a
GSP coordinates:	Not stated	Sasolburg: S26°49.542' E027°51.609' Secunda : 26°35'30.80"South, 29°10'55.79"East Checked with Google Earth and onsite visit.	☒ IRL #3
Technical Equipment – Main Components			
	PDD Description	Verification Findings(or Results?)	Conclusion and IRL
Equipment Description Component 1 (the overall configuration of the nitric acid plant including Ammonia Oxidization Reactor): Technical Features	Sasol Nitro (hereinafter called "Sasol") is a division of Sasol Chemical Industries Limited, a private company incorporated under the laws of the Republic of South Africa. Sasol Chemical Industries Limited is part of the Sasol group of companies (the Sasol Group) whose activities are coordinated by the holding company Sasol Limited, founded in 1950. The Sasol Group is an integrated oil and gas entity with substantial chemical interests. It is based in South Africa with its head office in Johannesburg, but also has manufacturing and marketing facilities elsewhere in Africa, Europe,	The project is fully implemented according to the description presented in the PDD. The verifier confirms, through the visual inspection that all physical features of the proposed CDM project activity including data collecting systems and storage have been implemented in accordance with the registered PDD. The project activity is completely operational and the same has been confirmed on-site. As described in the figure 5 in the page 12 of	☒ IRL #3, IRL #1a IRL #1e

Verification Protocol

Project Title: “Sasol Nitrous Oxide Abatement Project” – (0961)

Date of Completion: 14-11-2012

Number of Pages: 3 / 57



Industrie Service

Asia and the Americas. Sasol is listed on the Johannesburg Securities Exchange (JSE), symbol SOL, and the New York Stock Exchange (NYSE), symbol SSL. Sasol Chemical Industries Limited represents the Sasol Group's chemicals businesses with its portfolio including polymers, solvents, olefins, surfactants, waxes, phenolics and nitrogenous products. Sasol Nitro, a division of Sasol Chemical Industries Limited, represents the nitrogenous products and related goods; it manufactures and markets ammonia, nitric acid, fertilizers, phosphoric acid, a phosphoric detergent, commercial explosives and specialized blasting accessories. The division also markets ammonia, sulfur and specialty gases produced by other Sasol divisions. Sasol Nitro operates two nitric acid plants.

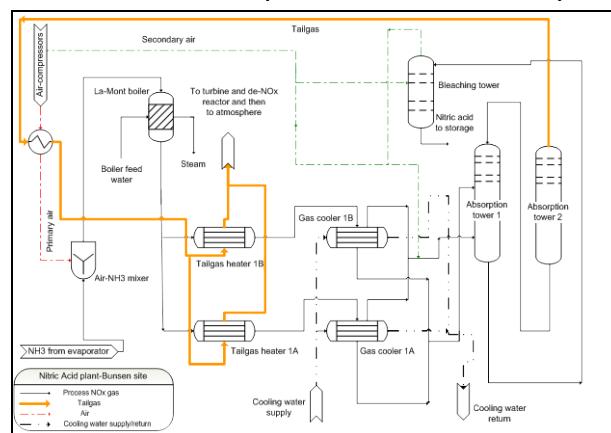


Figure 1. Project boundary for Sasolburg nitric acid plant

The smaller 557 ton 100% nitric acid per day unit in Sasolburg is linked to a downstream ammonium ni-

PDD for Sasolburg and in the figure 6 in the page 13 of PDD for Secunda, each plant consists of 1 Ammonia Oxidization Reactor (AOR) called “La-Mont boiler”, The campaign length is similarly 8 months at both plants.

The crediting period started as soon as the project was registered at UNFCCC, after the completion of baseline campaign. Since the 1st project campaign started prior to the registration of this CDM project, initial emission reductions made before the date of the registration has been eliminated after the determination of the project emission factor using the data measured during the entire period of the 1st project campaign. I.e. emission reductions has been calculated based on the amount of nitric acid produced after the start of the crediting period, using emission factor determined based on the entire data of the project campaign. The verifier has accepted this approach since the way of calculation exactly follows one specified in the applied methodology with no deviation. This approach has already applied at the 1st and the 2nd verification of this project and CERs has been issued.

No data and/or variables presented in the MR differ significantly from the stated in the registered PDD, which would to cause an increment of the ER in this period or in future periods in relation to the estimates in the registered PDD.

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 4 / 57



Industrie Service

trate plant. The ammonium nitrate is processed in Sasolburg to produce low density ammonium nitrate for use in the production of commercial explosives.

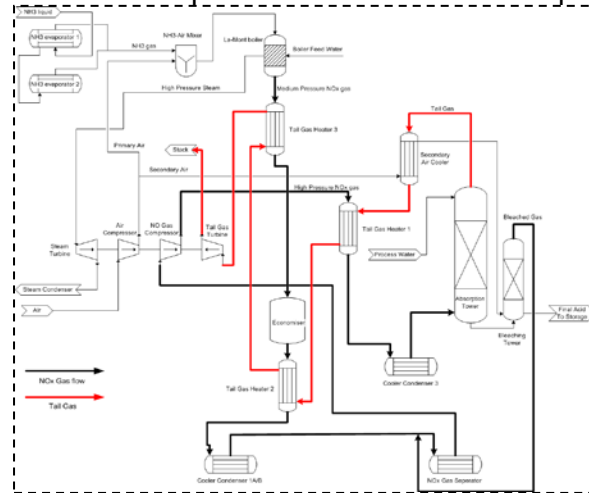


Figure 2. Project boundary for Secunda nitric acid plant

The larger 860 ton per day unit in Secunda supplies a downstream ammonium nitrate plant linked to a 500,000 ton per annum fertilizer granulation facility that produces limestone ammonium nitrate (LAN) and various other fertilizer grades containing nitrogen, phosphorus and potassium. Ammonium nitrate for industrial use is sourced from both sites.

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 5 / 57



Industrie Service

Component 2 (Ammonia Oxidization Reactor): Technical Features	Sasol Nitro operates two nitric acid plants. The smaller 557 ton 100% nitric acid per day unit in Sasolburg is linked to a downstream ammonium nitrate plant. The ammonium nitrate is processed in Sasolburg to produce low density ammonium nitrate for use in the production of commercial explosives. The larger 860 ton per day unit in Secunda supplies a downstream ammonium nitrate plant linked to a 500,000 ton per annum fertilizer granulation facility that produces limestone ammonium nitrate (LAN) and various other fertilizer grades containing nitrogen, phosphorus and potassium. Ammonium nitrate for industrial use is sourced from both sites.	To ensure the conformity with the conditions of "Applicability" specified in the methodology about "designed capacity" of nitric acid production at 2 plants at the end of 2005, an environmental certificate for continuing plant operation and design documents were successfully verified. For Sasolburg, the letter titled as "Re:Notes on 1973 design and test run data, Sasol HNO3 plant in Sasolburg, South Africa" dated 13 September 2006 provides the plant capacity data including old record as attachment made by Uhde, saying 522 ton 100% per day as the designed guaranteed minimum capacity and 556.8 ton 100% per day as demonstrated capacity in November 1973. For Secunda, the latest certificate with regard to atmospheric pollution, "Registration in terms of the Atmospheric Pollution Prevention ACT, 1965(ACT 45 of 1965)" dated on 04.Jan 1999 for the nitric acid processes is stating 860 t 100%HNO3/d which is consistent to one in PDD.	IRL #18a IRL #18b
Component 2 (Primary Gauze): Technical Features	Both Sasol plants have a Raschig ring bed as part of the support/homogenization system on their oxidation reactors. Due to its high degree of selectivity (towards N2O decomposition) the depth of the secondary catalyst bed to be installed is only a few centimetres thick, much thinner than the actual Raschig ring bed. To create space to insert the new catalyst, enough layers of Raschig rings will be removed from the basket. The precious metal coated ceramic pieces (the secondary catalyst) will come inside a cage of Kanthal or Megapyr steel (same material used for separating	Gauze Compositions, GCnormal are consistent with a specification including one for historic campaigns, called "Precious Metal Contents" provided by Heraeus, dated Nov 22, 2006. Both plant use FTCPlus however the composition used has been slightly different between 2 plants and such difference is also stated in the specification consistently to PDD. For Sasolburg plant, the letter from Heraeus titled "Re: Indicative costing for 16th FTCplus campaign" dated 10 January, 2008 states "indic-	☒

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 6 / 57



Industrie Service

	screens on the primary gauze pack) to secure even distribution of the pieces over the cross section area of the reactor. The outside rim of the caged catalyst is sealed with the reactor walls, in order to avoid any bypassing of the N₂O rich gases. Once the secondary catalyst is installed, the primary gauzes are placed on top of the basket, as usual. Then, the secondary catalyst acts as support system for the primary gauze pack and both catalysts are in close contact. Sasol uses the Heraeus FTC-system as primary catalyst which is a fully integrated catalytic package made of PGM alloys using the knitting technique. Each package is designed individually for the reactor and consists of different welded layers of HA- and FTC-gauzes. GS_{normal} : W.C. Heraeus for both plants GC_{normal} for Secunda: Pt 54.0 to 55.0 %, Rh 3.5 to 3.8 %, Pd 41.0 to 43.0 % GC_{normal} for Sasolburg: Pt 54.0 to 56.0 %, Rh 3.6 to 3.9 %, Pd 40.0 to 42.0%.	active costing for the campaign starting about 2nd October 2007" in the table. 5th -8th as full FTC campaigns, 9th – 14th as FTCPlus campaigns and 15th – 16th as projected campaigns. For Secunda plant, the letter from Heraeus titled "Re: 14th campaign -210 days – fixed rate" indicates actual history for 4th -12th (12th as the baseline). In accordance with these record as well as photos of gauzes installation is considered sufficient to prove that whole set of the primary catalyst was renewed at start of the baseline campaign at both Sasolburg and secunda. <u>Clarification Request #7.</u> Secunda: Please provide a statement from nitric acid plant manufacturer on the purpose of the pipe between N₂O concentration sample point and stack gas flow sample point as its purpose of emergency bypass of ammonia gas could not be completely evidenced onsite.	
Operation Status during verification			
	Verification Findings		Conclusion and IRL
Approvals / Licenses	Operation Permit of Nitric Acid plant at Sasolburg with regard to Atmospheric Air Pollution Prevention Act, 1965 issued by Department of Environmental Affairs and Tourism, issued on 28th December 2004 and "Registration in terms of the Atmospheric Pollution Prevention ACT, 1965(ACT 45 of 1965)" dated on 18.Feb 2002 for the nitric acid processes as the latest certificate with regard to atmospheric pollution at Secunda are explained to be the evidences as the permission of the plant operation given by the environmental authority. The Atmospheric Pollution Prevention Act (APPA) permit is still the latest certificate that Secunda has;		☒ IRL #21a IRL #21b

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 7 / 57



Industrie Service

	Sasol Nitro has submitted the application to The Department of Environmental and Tourism in terms of the Air Quality Act and is still awaiting the issuance of a new permit. The permit is expecting to be issued in 2011. The APPA permit issued in 2004 for Sasolburg plant is still valid.	
Actual Operation Status	This project has been registered at UNFCCC http://cdm.unfccc.int/Projects/DB/DNV-CUK1171877538.97/view since 25 May 2007 and the crediting period has started on the same day, after the end of baseline campaign on 5 March 2007 at Sasolburg and on 23 March 2007 at Secunda. The on-site visit was done on 19 – 21 April 2011. Both plants were in operation during onsite visit. This monitoring period #04 includes: August 4, 2009 to September 9, 2010 (both days included). The abovementioned period splits as follows: Sasolburg plant: - Fifth project campaign- from August 8, 2009 to May 2, 2010 - Sixth project campaign- from May 7, 2010 to September 9, 2010 Secunda plant: - Fourth project campaign- from August 4, 2009 to January 31, 2010. - Fifth project campaign- from February 5, 2010 to September 9, 2010. <u>Start date of the plant operation:</u> Nitric acid production has been operated since 1973 at Sasolburg and 1984 at Secunda. <u>Under construction :</u> AMS was installed at the end of 2005 at Sasolburg and during August 2006 at Secunda. <u>In operation :</u> The project has been operated since the start of baseline campaign on 12/06/2006 at Sasolburg and on 29/08/2006 at Secunda. <u>Out of operation:</u>	☒ IRL #6a IRL #6b CAR

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 8 / 57



Industrie Service

	Several shutdown happened are presented in GSP version of MR. <u>Corrective Action Request #3.</u> According the EB54 Annex34 information regarding the actual operation of the project activity during this monitoring period, including information on special events, for example overhaul times, downtimes of equipment, exchange of equipment, etc. shall be reported in the MR in section B.1. Please improve this section in the MR as e.g. there was no information found that would explain the fluctuations of N2O concentration in Secunda especially in project campaign #04.	
	At the moment of writing the PDD the concept of starting date of the project activity was not defined as it is now. Then, the date which was used as the starting date of the project activity was the date in which the project was supposed to start reducing emissions. Since Sasolburg plant started the first project campaign before than Secunda plant, the estimated date of the beginning of first project campaign at Sasolburg was used as the starting date of the project activity (01/03/2007). The actual date of the beginning of first project campaign at Sasolburg plant was 07/03/2007.	☒
Remarks on Special Operational Circumstances During the Verification Period	[Historic Campaigns & Permitted Operating Ranges] The permitted operating range for OT at Sasolburg was correctly determined based on the data recorded for 5 consecutive historic campaigns before baseline campaign (IRL #19) while the permitted operating conditions of all the rest at Sasolbug and Secunda were consistently determined based on Uhde's old Technical Document and confirmation letters from Uhde as well as from Heraus, due to no availability of hourly data recorded during historic campaigns, i.e. no hourly data recorded in hand writing logs and the record retention period stipulated previously to be 6months only at Secunda. Gauze composition used during historic campaigns were verified with the letter titled "fixed rate" issued at every campaign by Heraeus South Africa for both Sasolburg and Secunda.	☒ IRL #19a IRL #19b

1.2. Organization

Project Participant (s)

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 9 / 57



Industrie Service

	Verification Findings	Conclusion and IRL
Entity:	Sasol Nitro ; Sasol Financing (Pty) Limited / South Africa MGM Carbon Portfolio S.a.r.l. / Switzerland MGM Carbon Portfolio S.a.r.l. / United Kingdom of Great Britain and Northern Ireland	☒ IRL #0
CDM Project management:	PDD describes the hierarchical structure of the monitoring activities as well as the quality management system in Annex 4 of PDD registered. <pre> graph TD subgraph Core_Monitoring [] RPO[Responsible Plant Operator] --> ME[Monitoring Engineer] ME --> EPM[Each Plant Manager] EPM --> SMO[Senior Management overseeing Operations, including the General Manager, Operations] SMO --> SS[Shareholders of Sasol] EPM --> QAD[Quality Assurance Department] QAD --> SMO end EPM --> CER[Each Plant Manager] CER --> CO[CERs Owner] EPM --> DOE[DOE] ME --> STESG[Sasol Technology Engineering Support Group] STESG --> DOE DOE --> CEB[CDM Executive Board] </pre>	☒ IRL #0

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 10 / 57



Industrie Service

1.3. Quality Management System

General aspects of the Quality Management System		
	Verification Findings	Conclusion and IRL
Quality Management Manual:	Sasol Nitro Sasolburg has maintained the certification of ISO 9001- 2008 issued by "DQS GmbH Deutsche Gesellschaft zur Zertifizierung von Managementsystemen" for the scope "The manufacture and supply of ammonia, specialty gases, specific explosives and fertiliser product for both the local and selected export markets". At the both Sasolburg and Secunda, the overall QMS certified with ISO 9001:2008 covers CDM activities. In addition to existing procedures, several additional procedures have been developed specifically for CDM activities. Therefore the data or records are basically managed in their quality management system.	☒ IRL #22a IRL #22b
QM Implementation:	Quality assurance procedures are in place and operational. All involved staff is trained and made aware of the quality assurance procedures. Sasol has described key positions and roles in the applicable QMS documentation, typically in "Description of personnel involved in the CDM Project activities, SSBCDM-0010" for Sasolburg and "People involved in the CDM project activities at the plant, SECCDM-0005" for Secunda. These procedures include organization charts indicating hierarchical responsibilities from Plant Operator or from Area Managers to Senior Management or to Shareholders for Sasol, as well as descriptions about such responsibilities. As Raw data is automatically logged in the data acquisition system (hereinafter called "DAS" or "DCS"), plant operators or area managers are to supervise such system in cooperation with monitoring engineers. At both plants, Monitoring engineers have some administrative tasks like entering data into spread sheets and cross checking. The lists of key monitoring equipment for CDM activities have been established to ensure the conformance with the plan, and calibration is carried out and reported in a part of overall QMS certified with ISO 9001.	☒ IRL #22b

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 11 / 57



Industrie Service

	As a partner for this CDM project, MGM is supposed to be a "Project Developer" which is stated in above procedures, and is to receive above spread sheets from Sasol to process the data measured, to calculate and finally to issue a monitoring report. The data treatment of the Daily Events was checked by the verifier with intense awareness. It can be confirmed by the verifier that all data were treated according to the implemented routines and found to be correct. All quality control procedures established are functional and able to detect and correct inconsistencies or abnormality.	
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1.4. Outstanding FARs from previous Verifications (or forwarded issues from the validation report)

Outstanding Requests from Previous Verifications	Summary of project owner response	Audit team Conclusion and IRL
No FAR raised in validation report And there is no previous verification	N/A	N/A

2. Monitoring Plan Implementation

2.1. Parameters

Parameters					
Meth/tool	PDD	MR	Included in table	Compliance	Conclusion and IRL
NCSG N ₂ O concentration in the stack gas (mgN ₂ O/m ³ (converted from ppm if	NCSG N ₂ O concentration in the stack gas (mgN ₂ O/m ³ (converted from ppm if	NCSG N ₂ O concentration in the stack gas (mgN ₂ O/m ³ (converted from ppm if	2.2 Table 1	NCSG is measured with ABB AO2040 at both Sasolburg and Secunda plants. Calibration has been done and maintained with QAL2, QAL2 and AST to	☑

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 12 / 57



Industrie Service

Parameters					
Meth/tool	PDD	MR	Included in table	Compliance	Conclusion and IRL
necessary))	necessary))	necessary) (wet basis)		comply with EN14181.	
VSG Volume flow rate of the stack gas (m ³ /h)	VSG Volume flow rate in the stack gas (Nm ³ /h)	VSG Volume flow rate in the stack gas (Nm ³ /h (wet basis)	2.2 Table 2	In compliance	☑
BE _{BC} Total N ₂ O for baseline campaign (tN ₂ O)	BE _{BC} Total baseline emissions in the baseline measurement period (tN ₂ O)	BE _{BC} Total N ₂ O for the baseline campaign (tonne N ₂ O)	No, as this is calculated	In compliance	☑
PE _n N ₂ O emissions of nth project campaign (tN ₂ O)	PE _n Total Project emissions of the nth campaign (tN ₂ O)	PE _n N ₂ O emissions of project campaign (tonne N ₂ O)	No, as this is calculated	In compliance	☑
OH Operating hours (Hours)	OH Total operating hours (Hours)	OH Total operating hours (Hour)	No, as this is calculated	In compliance Clarification Request #6. Please provide transparent information on parameters and threshold values defining OH. Currently the MR includes only general information in Chapter D.2. in table "P.4 OH". Please provide individual information for Secunda and Sasolburg and	☑ CR

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 13 / 57



Industrie Service

Parameters					
Meth/tool	PDD	MR	Included in table	Compliance	Conclusion and IRL
				submit appropriate evidences.	
NAP Nitric Acid production (100% concentrate) (tHNO ₃)	NAP Total nitric acid production (ton 100% HNO ₃)	NAP Total nitric acid production (tonne 100% HNO ₃)	2.2 Table 3	In compliance The total amount of nitric acid (100% concentrated) produced during baseline campaigns and project campaigns, using Coriolis type mass flow meters at both plants, promass 83 at Secunda and Micro Motion at Sasolburg, in addition to daily concentration measurement at internal laboratories.	☑
TSG Temperature of stack gas	TSG Temperature of stack gas (°C)	TSG Temperature of stack gas (°C)	Stated together with VSG at section 2.2, Table 2	In compliance TSG is measured with thermocouple type K at Sasolburg and Pt100 at Secunda, incorporated in the tail gas flow meter. Calibration has been done together with the flow meter at QAL2/AST	☑
PSG Pressure of stack gas (unit is not specified)	PSG Pressure of stack gas (bar)	PSG Pressure of stack gas (bar)	Stated together with VSG at section 2.2, Table 2	In compliance PSG is measured with a pressure sensor, measuring the static pressure of the tail gas, incorporated in the tail gas flow meter. Calibration has been done together with the flow meter at QAL2/AST	☑
EF _{BL} Emissions factor	EF _{BL} Baseline emission	EF _{BL} Baseline emission	No, as this is calculated	In compliance While PDD states the unit as	☑

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 14 / 57



Industrie Service

Parameters					
Meth/tool	PDD	MR	Included in table	Compliance	Conclusion and IRL
for baseline period (tN ₂ O/tHNO ₃)	factor (kg N ₂ O / ton 100% HNO ₃)	factor (ton N ₂ O / ton 100% HNO ₃)		kgN ₂ O/tHNO ₃ to make it consistent to IPCC default, one in monitoring report is stated consistently to the applied methodology.	
UNC Overall measurement uncertainty of the monitoring system (%)	UNC Overall uncertainty of the monitoring system (%)	UNC Overall uncertainty of the monitoring system (%)	No, as this is calculated	In compliance QAL2 reports from 2007 (relevant for baseline campaign) state +/- 3.89% for Sasolburg plant and +/- 4.14 for Secunda plant. AST report states that QAL2 results have been sufficiently maintained.	☒ IRL #9a-d
EF _n Emissions factor calculated for nth campaign (tN ₂ O/tHNO ₃)	EF _n Emissions factor calculated for nth campaign (kgN ₂ O / ton100%HNO ₃)	EF _n Project emissions factor calculated for nth campaign (toneN ₂ O / tonne100%HNO ₃)	No, as this is calculated	In compliance Calculate in accordance with the applied methodology as well as the registered monitoring plan.	☒
EF _{mn,a} Moving average emissions factor (tN ₂ O/tHNO ₃)	EF _{mn,a} moving average emissions factor calculated at the end of the <i>nth</i> project campaign	EF _{mn,a} Moving average of emission factor calculated as the average of the emission factors of all previous project campaigns (toneN ₂ O / tonne100%HNO ₃)	No, as this is calculated	In compliance Calculate in accordance with the applied methodology as well as the registered monitoring plan.	☒

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 15 / 57



Industrie Service

Parameters					
Meth/tool	PDD	MR	Included in table	Compliance	Conclusion and IRL
EF _{min} Minimum emissions factor after 10 campaigns (tN ₂ O/tHNO ₃)	EF _{min} Minimum emissions factor after 10 campaigns (tN ₂ O/tHNO ₃)	EF _{min} Minimum emissions factor after 10 campaigns (tN ₂ O/tHNO ₃)	N/A	In compliance 10 campaigns have not been reached in this project.	☑
EF _{reg} Emissions level set by incoming policies or regulations	EF _{reg} Local and national regulations on N ₂ O and NOX emissions (Kgs N ₂ O / ton HNO ₃)	EF _{reg} Local and national regulations on N ₂ O and NOX emissions (kg N ₂ O/ tonne HNO ₃)	N/A	In compliance No local or national regulation has been introduced during the project period	☑
CL _n Campaign length (tHNO ₃)	CL _n Campaign length (Ton 100% HNO ₃)	CL _n Campaign length (tonne 100% HNO ₃)	No, as this is calculated	In compliance.	☑
AFR Ammonia gas flow rate to the AOR (kgNH ₃ /h)	AFR Ammonia flow rate to the AOR (kgNH ₃ /hr)	AFR Ammonia flow rate to the AOR (kgNH ₃ /hr)	Stated at section 2.2, Table 4	In compliance.	☑
AIFR Ammonia to Air ratio (m ³ /h) (& (%)) in page 5)	AIFR Ammonia to air flow rate to the AOR (Kg NH ₃ /hour)	AIFR Ammonia to air flow rate to the AOR (kg NH ₃ /kg Air)	Stated at section 2.2, Table 5	In compliance.	☑
OT _h Oxidation temperature for	OT _h Oxidation temperature of the AOR	OT _h Oxidation temperature of the AOR	Stated at section 2.2, Table 6	In compliance.	☑

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 16 / 57



Industrie Service

Parameters					
Meth/tool	PDD	MR	Included in table	Compliance	Conclusion and IRL
each hour (°C)	(°C)	(°C)			
OP _h Oxidation Pressure for each hour (Pa)	OP _h Oxidation Pressure of the AOR (Bar)	OP _h Oxidation Pressure of the AOR (bar)	Stated at section 2.2, Table 7	In compliance.	☑
GS, Gauze supplier	GS, Gauze supplier	GS, Gauze supplier	Stated at section 2.4, Table 1	In compliance. No change, Heraeus	☑
GC Gauze composi- tion	GC Gauze composi- tion	GC Gauze composi- tion	Stated at section 2.4, Table 1	In compliance. No change.	☑

2.2. Parameters measured directly with instruments in the field

Table 1

Parameter and instrumentation Information					
	Meth/Tool	PDD	MR	Verification Findings	Conclusion and IRL
Parameter title	N ₂ O concentra- tion in the stack gas	N ₂ O concentra- tion in the stack gas	N ₂ O concentration in the stack gas	In compliance	☑ IRL #0, #2
Parameter ID (if available)	NCSG	NCSG	NCSG	In compliance	

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 17 / 57



Industrie Service

Data Unit	mgN ₂ O/m ³ (converted from ppm if necessary)	mgN ₂ O/m ³ (converted from ppm if necessary)	mgN ₂ O/m ³ (converted from ppm if necessary) (wet basis)		
Monitoring frequency (reading)	not referred	not referred	not referred	In compliance	
Monitoring frequency (recording)	Every 2 seconds	Every 2 seconds	Every 2 seconds	The recording frequency of every 2 seconds is verified with back-upped data on the display of monitoring PC during the site visit.	
Calibration requirements	The monitoring system is to be installed using the European Norm 14181 (2004). Regular calibrations according to vendor specifications and recognised industry standards (EN14181).	Regular calibrations according to vendor specifications and recognised industry standards	QAL2, QAL3, AST are referred	Calibration has sufficiently been done through QAL1, QAL2/AST and QAL3 to comply with EN14181 <u>Corrective Action Request #1.</u> In August 2010 a new QAL 2 has been performed. However, the new QAL2 parameters were not found to be implemented for Sasolburg. Please provide a revised emission reduction calculation tool and a revised MR. <u>Corrective Action Request #4.</u> Span checks were found to be out of limit in Secunda in the Shewhart chart but no correction of data was found to be done. Please clarify the procedure which is applied in events when zero or span checks	☒ IRL #1a, IRL #2a, IRL #1c, IRL #8a, IRL #8b IRL #9a-d

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 18 / 57



Industrie Service

				are found to be out of limit and apply this procedure to all such events.	
Uncertainty level	Low	2.77% for Sasolburg and 2.67% for Secunda were "estimated" as the overall uncertainty of AMS based on the specifications	Overall uncertainties determined by QAL 2 in 2007: +/-3.89% for Sasolburg plant +/- 4.14 for Secunda plant In 2010: +/-4.65% for Sasolburg plant +/- 4.29 for Secunda plant	In compliance	☒ IRL #1a, IRL #1c, IRL #2a, IRL #8a, IRL #8b IRL #9a-f
Measurement Principle (if applicable)	N2O analyser	on-line analyzer (Non Dispersive Infra Red principle)	AMS (infrared gas analyzer)	In compliance	☒ IRL #1a, IRL #1c, IRL #2a,
Technical aspects					
Instrument Type:	NCSG is measured with ABB AO2040 at both Sasolburg and Secunda plants.				☒ IRL #9a-f
Serial Number:	24031-0-331004300000, 24031-0-331004300000				☒
Manufacturer Model Nr.:	ABB, model AO 2040				☒
Specific Location:	The analyzer is installed in the control panel separately. Tail gas is extracted from the stack with a probe. The sample gas is transported through a Teflon tube to the analyzer via a pump.				☒
Measurement Range:	0-500 ppmv (0-925 (kgN ₂ O/m ³) at Sasolburg (QAL2 2010: calibrated range 441 ppm),				☒

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 19 / 57



Industrie Service

	0-2000 ppmv (0-3,700 (kgN ₂ O/m ³) at Secunda (QAL2 2010: calibrated range 955.9 ppm)		IRL #9e IRL #9f
Gaps in operating time of instrument :	Period :		☒ IRL #14b IRL #14d IRL #14f IRL #14h
	Sasolburg:		
	#5 campaign		
	From	To	
	02 Jan '10 22:00 13 Jan '10 09:00 28 Feb '10 04:00	06 Jan '10 18:00 13 Jan '10 09:00 01 Mrz '10 08:00	
	#6 campaign		
	From	To	
	07 Mai '10 18:00 30 Mai '10 01:00 20 Okt '10 08:00	08 Mai '10 07:00 31 Mai '10 14:00 21 Okt '10 09:00	
Secunda			
#4 campaign			
From	To		
01-Mai-09 00:00:00 01-Mai-09 17:00:00 02-Mai-09 05:00:00	01-Mai-09 04:00:00 01-Mai-09 23:00:00 02-Mai-09 08:00:00		

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 20 / 57



Industrie Service

	06-Mai-09 00:00:00	08-Mai-09 23:00:00		
	27-Mai-09 00:00:00	27-Mai-09 23:00:00		
	26-Jun-09 16:00:00	27-Jun-09 13:00:00		
	28-Jun-09 00:00:00	29-Jun-09 23:00:00		
	03-Aug-09 00:00:00	03-Aug-09 23:00:00		
	04-Aug-09 05:00:00	04-Aug-09 08:00:00		
	06-Aug-09 14:00:00	06-Aug-09 20:00:00		
	07-Aug-09 00:00:00	07-Aug-09 01:00:00		
	07-Aug-09 11:00:00	07-Aug-09 18:00:00		
	07-Aug-09 20:00:00	07-Aug-09 23:00:00		
	08-Aug-09 13:00:00	08-Aug-09 17:00:00		
	08-Aug-09 21:00:00	08-Aug-09 22:00:00		
	10-Aug-09 00:00:00	10-Aug-09 04:00:00		
	10-Aug-09 18:00:00	11-Aug-09 23:00:00		
	12-Aug-09 05:00:00	12-Aug-09 05:00:00		
	12-Aug-09 07:00:00	12-Aug-09 23:00:00		
	13-Aug-09 13:00:00	13-Aug-09 20:00:00		
	14-Aug-09 13:00:00	14-Aug-09 18:00:00		
	14-Aug-09 21:00:00	14-Aug-09 22:00:00		
	15-Aug-09 00:00:00	15-Aug-09 01:00:00		
	15-Aug-09 12:00:00	15-Aug-09 19:00:00		
	15-Aug-09 21:00:00	15-Aug-09 23:00:00		
	16-Aug-09 10:00:00	16-Aug-09 19:00:00		
	17-Aug-09 12:00:00	17-Aug-09 13:00:00		
	26-Okt-09 00:00:00	26-Okt-09 23:00:00		
	07-Jan-10 05:00:00	07-Jan-10 13:00:00		

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 21 / 57



Industrie Service

	<table><tr><th>#5 campaign From</th><th>To</th></tr><tr><td>05-Feb-10 16:00</td><td>06-Feb-10 08:00</td></tr><tr><td>01-Mrz-10 10:00:00</td><td>01-Mrz-10 10:00:00</td></tr><tr><td>01-Mrz-10 12:00:00</td><td>01-Mrz-10 12:00:00</td></tr><tr><td>01-Mrz-10 18:00:00</td><td>02-Mrz-10 06:00:00</td></tr><tr><td>17-Mrz-10 15:00:00</td><td>17-Mrz-10 16:00:00</td></tr><tr><td>07-Apr-10 01:00:00</td><td>07-Apr-10 07:00:00</td></tr><tr><td>18-Jul-10 17:00:00</td><td>19-Jul-10 08:00:00</td></tr><tr><td>31-Jul-10 20:00:00</td><td>31-Jul-10 21:00:00</td></tr><tr><td>04-Sep-10 16:00:00</td><td>06-Sep-10 08:00:00</td></tr></table>	#5 campaign From	To	05-Feb-10 16:00	06-Feb-10 08:00	01-Mrz-10 10:00:00	01-Mrz-10 10:00:00	01-Mrz-10 12:00:00	01-Mrz-10 12:00:00	01-Mrz-10 18:00:00	02-Mrz-10 06:00:00	17-Mrz-10 15:00:00	17-Mrz-10 16:00:00	07-Apr-10 01:00:00	07-Apr-10 07:00:00	18-Jul-10 17:00:00	19-Jul-10 08:00:00	31-Jul-10 20:00:00	31-Jul-10 21:00:00	04-Sep-10 16:00:00	06-Sep-10 08:00:00	
#5 campaign From	To																					
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17-Mrz-10 15:00:00	17-Mrz-10 16:00:00																					
07-Apr-10 01:00:00	07-Apr-10 07:00:00																					
18-Jul-10 17:00:00	19-Jul-10 08:00:00																					
31-Jul-10 20:00:00	31-Jul-10 21:00:00																					
04-Sep-10 16:00:00	06-Sep-10 08:00:00																					
	Default value used : The highest value measured during the entire project campaign is applied in accordance with the applied methodology.	☒ IRL #14b IRL #14d IRL #14f IRL #14h																				
	QA/QC aspects	Conclusion and IRL																				
Source of data	At Sasolburg, all CDM data are monitored continuously on the DeltaV Distributed Control System (DCS) by production personnel in the Control Room. The Instrument Engineer will be responsible for the AMS, data gathering and report generation. Primary data storage is done in a PI database, which form an integral part of the DCS system, at two second intervals. Data are stored in batches of about six days, with only the last five months data continuously available on the DCS. Scheduled backups of the last four batch files are made on a CD every 24 days and stored in a fireproof safe at the Ammonia plant. This data must be restored on the originating PI database	☒ IRL #1c IRL #3 IRL #22b																				

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 22 / 57



Industrie Service

	before the data can be viewed or interrogated. With the completion of a campaign, data will be transferred from backup CD's to a DVD to minimize space requirements in the fireproof safe. Data are also stored at 30 second intervals in a secondary database which form part of the Sasol Local Area Network and can be viewed from any LAN point. This second database can also be used for reporting should there be a major failure of the primary database At Secunda, all CDM data are monitored continuously on the remote located PC (in the plant control room) via the SCADA INTOUCH and ACTIVE FACTORY software package by production personnel in the Control Room. The PC has access rights to the DAS server computer where the raw data from the instruments is written on a continuous basis. The Area Leader/Manager Maintenance - Engineer will be responsible for the AMS, data gathering and report generation. A daily summary report of hourly average data is generated by the DAS and a unique file is written to the common disk drive (analyzer Z:\) every morning at 05:00AM from where it can be viewed by selected personnel only, in this case the Monitoring Engineer and the Plant production Area leader. This file is safeguarded as read only and cannot be modified or changed as only the third party consultant who developed the DAS and AMS has the password to bypass the safeguarding and access the file for modification. All raw data written to the server hard disk drives, which are setup up using five identical hard disk drives in parallel service is available at any time and can be written to DVD format and forwarded to any party concerned.	
Archiving of raw data and protection measures	As mentioned above.	☒
Data transfer and protection of input data for calculations	As mentioned above.	☒
	Quality of evidence	Conclusion and IRL
Completeness of data	All hourly data have been submitted in the calculation spreadsheet so that the verifier could re-view the integrity from various point of view, e.g. normality on the series data, graphical check, comparison to one from other sources.	☒ IRL #14
Data verification	Consistency of calculation tool with monitoring report: Values of calculation tool and Monitoring Report has been reviewed after receiving the final versions.	☒ IRL #1c

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 23 / 57



Industrie Service

	<u>Clarification Request #2.</u> Please provide the certificate for test gas used for QAL3 span checks of the analyser in the period 26/08/2009 to 06/12/2010 in Sasolburg. <u>Clarification Request #8.</u> Secunda: Please provide the certificate of test gas used during second half of 5th project campaign with concentration of 1314ppm according to Shewhart Chart and the certificate of test gas used during first half of 4th campaign with concentration of 1080ppm according to Shewhart Chart.	IRL #14
Crosscheck (if available)	In order to ensure the integrity of the data, the verification team reviewed the series of hourly data in parallel with other parameters including to make a graph with the Excel file calculation sheet submitted.	☒

Table 2

Parameter and instrumentation Information					
	Meth/Tool	PDD	MR	Verification Findings	Conclusion and IRL
Parameter title	Volume flow rate of the stack gas	Volume flow rate in the stack gas	Volume flow rate in the stack gas	In compliance	☒ IRL #1a, IRL #2a, IRL #1c,
Parameter ID (if available)	VSG	VSG	VSG	In compliance	
Data Unit	m3/h	Nm3/h	Nm ³ /h (wet basis)	In compliance	
Monitoring frequency (reading)	not referred	not referred	not referred	In compliance	
Monitoring frequency (re-	Every 2 seconds	Every 2 seconds	Every 2 seconds	The recording frequency of every 2 seconds is verified with back-upped	

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 24 / 57



Industrie Service

cording)				data in CSV format saved and retained in CD-Rs during the site visit	
Calibration requirements	The monitoring system is to be installed using the European Norm 14181 (2004). Regular calibrations according to vendor specifications and recognised industry standards (EN14181).	Regular calibrations according to vendor specifications and recognised industry standards (EN14181).	QAL2, QAL3, AST are referred	Calibration has sufficiently been done through QAL2 and AST to comply with EN14181	☒ IRL #1a, IRL #2a, IRL #1c, IRL #8a, IRL #8b IRL #9a-d
Uncertainty level	Low	2.77% for Sasolburg and 2.67% for Secunda were "estimated" as the overall uncertainty of AMS based on the specifications	Overall uncertainties determined by QAL 2 in 2007: +/-3.89% for Sasolburg plant +/- 4.14 for Secunda plant In 2010: +/-4.65% for Sasolburg plant +/- 4.29 for Secunda plant	In compliance	☒ IRL #1a, IRL #1c, IRL #2a, IRL #8a, IRL #8b IRL #9a-f
Measurement Principle (if applicable)	Gas volume flow meter	An Ultrasound principle device at Sasolburg. ANNUBAR de-	AMS (flow meter)	In compliance. Sick Maihak FLSE PMD20SSALA (Ultrasonic type) at Sasolburg and	☒ IRL #1a, IRL #1c,

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 25 / 57



Industrie Service

		vice (multiple pressure differential principle) at Secunda		Rosemount Multipoint Annubar TAG at Secunda	IRL #2a,
	Technical aspects				
Instrument Type:	Ultrasonic type at Sasolburg and multiple pressure differential type at Secunda				☒ IRL #9a-f
Serial Number:	05428742, 0135A				☒ IRL #9a-f
Manufacturer Model Nr.:	Sick Maihak FLOWSIC100(FLSE PMD20SSALA), Rosemount Multipoint Annubar TAG				IRL #9a-f
Specific Location:	Probes on the vertical stack.				☒
Measurement Range:	Calibrated range (QAL2 2010): Sasolburg 0-85574 m³/h Secunda 0-131584 m³/h				☒ IRL #9a-f
Gaps in operating time of instrument :	Period :				
	Sasolburg:				
	#5 campaign: No gaps				
	#6 campaign: 08 Nov '10 11:00				
	Secunda:				
	#4 campaign From	To			
	06-Mai-09 00:00:00	08-Mai-09 23:00:00			
	27-Mai-09 00:00:00	27-Mai-09 23:00:00			
	26-Jun-09 16:00:00	27-Jun-09 13:00:00			
	28-Jun-09 00:00:00	29-Jun-09 23:00:00			

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 26 / 57



Industrie Service

	26-Okt-09 00:00:00	26-Okt-09 23:00:00	
	#5 campaign: No gaps		
	Default value used : The highest value measured during the entire project campaign is applied in accordance with the applied methodology.		☒ IRL #14b IRL #14d IRL #14f IRL #14h
	QA/QC aspects		Conclusion and IRL
Source of data	At Sasolburg, all CDM data are monitored continuously on the DeltaV Distributed Control System (DCS) by production personnel in the Control Room. The Instrument Engineer will be responsible for the AMS, data gathering and report generation. Primary data storage is done in a PI data-base, which form an integral part of the DCS system, at two second intervals. Data are stored in batches of about six days, with only the last five months data continuously available on the DCS. Scheduled backups of the last four batch files are made on a CD every 24 days and stored in a fireproof safe at the Ammonia plant. This data must be restored on the originating PI database before the data can be viewed or interrogated. With the completion of a campaign, data will be transferred from backup CD's to a DVD to minimize space requirements in the fireproof safe. Data are also stored at 30 second intervals in a secondary database which form part of the Sasol Local Area Network and can be viewed from any LAN point. This second database can also be used for reporting should there be a major failure of the primary database At Secunda, all CDM data are monitored continuously on the remote located PC (in the plant control room) via the SCADA INTOUCH and ACTIVE FACTORY software package by production personnel in the Control Room. The PC has access rights to the DAS server computer where the raw data from the instruments is written on a continuous basis. The Area Leader/Manager Maintenance - Engineer will be responsible for the AMS, data gathering and report generation. A daily summary report of hourly average data is generated by the DAS and a unique file is written		☒ IRL #1c IRL #3 IRL #22b

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 27 / 57



Industrie Service

	to the common disk drive (analyzer Z:\) every morning at 05:00AM from where it can be viewed by selected personnel only, in this case the Monitoring Engineer and the Plant production Area leader. This file is safeguarded as read only and cannot be modified or changed as only the third party consultant who developed the DAS and AMS has the password to bypass the safeguarding and access the file for modification. All raw data written to the server hard disk drives, which are setup up using five identical hard disk drives in parallel service is available at any time and can be written to DVD format and forwarded to any party concerned.	
Archiving of raw data and protection measures	As mentioned above.	☒
Data transfer and protection of input data for calculations	As mentioned above.	☒
	Quality of evidence	Conclusion and IRL
Completeness of data	All hourly data have been submitted in the calculation spreadsheet so that the verifier could review the integrity from various point of view, e.g. normality on the series data, graphical check, comparison to one from other sources.	☒ IRL #14
Data verification	Consistency of calculation tool with monitoring report: Values of calculation tool and Monitoring Report has been reviewed after receiving the final versions.	☒ IRL #1c IRL #14
Crosscheck (if available)	In order to ensure the integrity of the data, the verification team reviewed the series of hourly data in parallel with other parameters including to make a graph with the Excel file calculation sheet submitted.	☒

Table 3

Parameter and instrumentation Information					
	Meth/Tool	PDD	MR	Verification Findings	Conclusion

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 28 / 57



Industrie Service

					and IRL
Parameter title	Nitric Acid production (100% concentrate)	Total nitric acid production	Total nitric acid production	In compliance	☒ IRL #1a, IRL #2a, IRL #1c
Parameter ID (if available)	NAP	NAP	NAP	In compliance	
Data Unit	tHNO ₃	ton 100% HNO ₃	tonne 100% HNO ₃	In compliance	
Monitoring frequency (reading)	not referred	Measured daily	not referred	In compliance	
Monitoring frequency (recording)	Daily, compiled for entire campaign	Recorded daily	Daily	Daily data has been submitted in the excel file (IRL#14)	
Calibration requirements	Included in evaluation by third party validator	Critical instruments are calibrated on a routinely basis according to the quality assurance system of the plant (ISO 9000).	Two yearly (Sasolburg), "exchange and check instrument with every gauze change" (Secunda)	Sasolburg: Latest calibration 11-Apr-2008 23-Oct-2009 <u>Clarification Request #4.</u> Secunda: Please clarify calibration procedure for nitric acid flow meter and provide all relevant calibration certificates. Furthermore please clarify the validity of calibration of nitric acid flow meter as the MR states 1 year but different information was gained during onsite interviews. In case the information stated in MR needs to be corrected appropriate evidence must be submitted.	☒ IRL 9g IRL 9h

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 29 / 57



Industrie Service

Uncertainty level	Low	not referred	not referred	In accordance with the calibration certificate issued on Nov. 2007 by Micro Motion, the uncertainty in the specification is stated as $\pm 0,03\%$.	☒ IRL #9i
Measurement Principle (if applicable)	Not specified as only "Production log" is referred as the source.	an accurate mass flow meter (Coriolis principle)	not referred	Coriolis type flowmeter is used at both plant.	☒ IRL #1a, IRL #2a, IRL #1c
Technical aspects					
Instrument Type:	Coriolis type mass flow measurement				☒ IRL #1a, #2a, #1c, #6
Serial Number:	Sasolburg: 3747530, 3747532, 11035097(Transmitter)/12034695(Sensor), Secunda : C200BD20000				☒ IRL #3
Manufacturer Model Nr.:	Sasolburg: Micromotion Rosemount RFT9739D4SU4, Secunda: Endress Hauser Promass 83F				☒
Specific Location:	On the piping of nitric acid being transported from the absorption tower to the ammonium nitrate production process.				☒
Measurement Range:	0 - 34,540 kg/hr, 0 – 80 ton/h				☒
Gaps in operating time of instrument :	Sasolburg 5th campaign: No data from 21-Dec-2009 to 8-Jan-2010 malfunctioning after lightning storm Sasolburg 6th campaign: no gaps in data Secunda 4th campaign: no gaps in data Secunda 5th campaign: no gaps in data				☒ IRL #14b IRL #14d IRL #14f IRL #14h
	Default value: Values from mass balance				☒

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 30 / 57



Industrie Service

	The nitric acid flow measured via coriolis is daily crosschecked via mass balance. A procedure for crosschecking has been implemented "SSBCDM0011 - Explanation of procedure to cross check nitric acid production". Daily mass balance values were used as default values for the period of gaps in data stated above. The verifier confirms that the data from mass balance and nitric acid flow meter highly correlates. And the difference between those values is small (usually <4%). Hence the default value is found to reliable and appropriate.	☒ IRL 5a IRL 22a
	QA/QC aspects	Conclusion and IRL
Source of data	At Sasolburg, all CDM data are monitored continuously on the DeltaV Distributed Control System (DCS) by production personnel in the Control Room. The Instrument Engineer will be responsible for the AMS, data gathering and report generation. Primary data storage is done in a PI database, which form an integral part of the DCS system, at two second intervals. Data are stored in batches of about six days, with only the last five months data continuously available on the DCS. Scheduled backups of the last four batch files are made on a CD every 24 days and stored in a fireproof safe at the Ammonia plant. This data must be restored on the originating PI database before the data can be viewed or interrogated. With the completion of a campaign, data will be transferred from backup CD's to a DVD to minimize space requirements in the fireproof safe. Data are also stored at 30 second intervals in a secondary database which form part of the Sasol Local Area Network and can be viewed from any LAN point. This second database can also be used for reporting should there be a major failure of the primary database At Secunda, all CDM data are monitored continuously on the remote located PC (in the plant control room) via the SCADA INTOUCH and ACTIVE FACTORY software package by production personnel in the Control Room. The PC has access rights to the DAS server computer where the raw data from the instruments is written on a continuous basis. The Area Leader/Manager Maintenance - Engineer will be responsible for the AMS, data gathering and report generation. A daily summary report of hourly average data is generated by the DAS and a unique file is written to the common disk drive (analyzer Z:\) every morning at 05:00AM from where it can be viewed by selected personnel only, in this case the Monitoring Engineer and the Plant production Area leader. This file is safeguarded as read only and cannot be modified or changed as only the third party consultant who developed the DAS and AMS has the password to bypass the safeguarding and access the file for modification. All raw data written to the server hard disk drives, which are	☒ IRL #1c IRL #3 IRL #22b

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 31 / 57



Industrie Service

	setup up using five identical hard disk drives in parallel service is available at any time and can be written to DVD format and forwarded to any party concerned.	
Archiving of raw data and protection measures	As mentioned above all the measured data is archived on the PC. The data archived is periodically backed up in text files in CD-Rs/DVDs	☑
Data transfer and protection of input data for calculations	While there is physical access control to enter the monitoring room where PCs are installed, the personnel who may operate the PCs has been specified as his responsibility. In addition, the data backed up in CD-Rs/DVDs is not editable.	☑
	Quality of evidence	Conclusion and IRL
Completeness of data	All applicable daily data has been submitted in the Excel file.	☑
Data verification	The graphical analysis has been done e.g. the comparison between ammonia supply and acid production, in addition to the consistency between calculation tool and monitoring report.	IRL #1c IRL #14
Crosscheck (if available)	Sasolburg: nitric acid production is crosscheck according to a procedure (SSBCDM0011) The monthly crosscheck data are available and confirm reliability of HNO3 production values. Secunda: nitric acid production is crosscheck according to a procedure (SSBCDM-0006). The monthly crosscheck data are available and confirm reliability of HNO3 production values.	☑ IRL #22b IRL #15a IRL #15b

Table 4

Parameter and instrumentation Information					
	Meth/Tool	PDD	MR	Verification Findings	Conclusion and IRL
Parameter title	Ammonia gas flow rate to the AOR	Ammonia flow rate to the AOR	Ammonia flow rate to the AOR	In compliance	☑ IRL #1a, IRL #2a,
Parameter ID (if available)	AFR	AFR	AFR	In compliance	

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 32 / 57



Industrie Service

Data Unit	kgNH3/h	kgNH3/h	kgNH3/h	In compliance	IRL #1c
Monitoring frequency (reading)	not referred	at a given time interval	not referred	In compliance	
Monitoring frequency (recording)	Continuously	at a given time interval	Continuously	In compliance	
Calibration requirements	Included in evaluation by third party validator	Critical instruments are calibrated on a routinely basis according to the quality assurance system of the plant (ISO 9000).	Yearly	In compliance This parameter is required to be monitored for baseline campaign only by AM0034 version 2.	☒ IRL 9j
Uncertainty level	Low	not referred	not referred		☒
Measurement Principle (if applicable)	Not specified	orifice plate principle	not referred	In compliance Actually orifice & differential pressure transmitter are used.	☒
Technical aspects					
Instrument Type:	orifice and differential pressure transmitter				☒
Serial Number:	Saaolburg: 1526279 & 1526306 & 1458162, Secunda: 824567				☒
Manufacturer Model Nr.:	Rosemount 3051, Honeywell ST3000				☒
Specific Location:	On the piping of ammonia supply before NH3 & Air mixer				☒
Measurement Range:	0 – 1,800 Nm3/h				☒
Gaps in operating time of instrument :	There has been no gap in operation during the baseline campaign				☒
	N/A				☒

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 33 / 57



Industrie Service

	N/A	☒
	QA/QC aspects	Conclusion and IRL
Source of data	At Sasolburg, all CDM data are monitored continuously on the DeltaV Distributed Control System (DCS) by production personnel in the Control Room. The Instrument Engineer will be responsible for the AMS, data gathering and report generation. Primary data storage is done in a PI data-base, which form an integral part of the DCS system, at two second intervals. Data are stored in batches of about six days, with only the last five months data continuously available on the DCS. Scheduled backups of the last four batch files are made on a CD every 24 days and stored in a fireproof safe at the Ammonia plant. This data must be restored on the originating PI database before the data can be viewed or interrogated. With the completion of a campaign, data will be transferred from backup CD's to a DVD to minimize space requirements in the fireproof safe. Data are also stored at 30 second intervals in a secondary database which form part of the Sasol Local Area Network and can be viewed from any LAN point. This second database can also be used for reporting should there be a major failure of the primary database At Secunda, all CDM data are monitored continuously on the remote located PC (in the plant control room) via the SCADA INTOUCH and ACTIVE FACTORY software package by production personnel in the Control Room. The PC has access rights to the DAS server computer where the raw data from the instruments is written on a continuous basis. The Area Leader/Manager Maintenance - Engineer will be responsible for the AMS, data gathering and report generation. A daily summary report of hourly average data is generated by the DAS and a unique file is written to the common disk drive (analyzer Z:\) every morning at 05:00AM from where it can be viewed by selected personnel only, in this case the Monitoring Engineer and the Plant production Area leader. This file is safeguarded as read only and cannot be modified or changed as only the third party consultant who developed the DAS and AMS has the password to bypass the safeguarding and access the file for modification. All raw data written to the server hard disk drives, which are setup up using five identical hard disk drives in parallel service is available at any time and can be written to DVD format and forwarded to any party concerned.	☒ IRL #1c IRL #3 IRL #22b
Archiving of raw data and protection measures	As mentioned above all the measured data is archived on the PC. The data archived is periodically backed up in text files in CD-Rs/DVDs	☒

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 34 / 57



Industrie Service

Data transfer and protection of input data for calculations	While there is physical access control to enter the monitoring room where PCs are installed, the personnel who may operate the PCs has been specified as his responsibility. In addition, the data backed up in CD-Rs/DVDs is not editable.	☒
	Quality of evidence	Conclusion and IRL
Completeness of data	All applicable hourly data measured during baseline campaign has been submitted in the Excel file. (N/A for project campaigns)	☒ IRL #1a
Data verification	Maximum ammonia gas flow rate to the AOR as the permitted operating range has been determined in accordance with the maximum load specified by the primary catalyst manufacture (IRL #19, letter from Heraeus dated on Oct and Nov 2006). And the comparison between the data measured during baseline campaign and the permitted operating range was correctly done. But, this parameter is not required to be monitored during project campaigns.	IRL #1c IRL #14
Crosscheck (if available)	The graphical analysis has been done e.g. the comparison between ammonia supply and acid production, in addition to the consistency between calculation tool and monitoring report.	☒

Table 5

Parameter and instrumentation Information					
	Meth/Tool	PDD	MR	Verification Findings	Conclusion and IRL
Parameter title	Ammonia to Air ratio	Ammonia to air flow rate to the AOR	Ammonia to air flow rate to the AOR	In compliance	☒ IRL #1a, IRL #2a, IRL #1c
Parameter ID (if available)	AIFR	AIFR	AIFR	In compliance	
Data Unit	m3/h, & % in page 5	Kg NH3/hour	Kg NH3/Kg Air	In compliance (since the parameter is the rate)	
Monitoring frequency (read-	not referred	at a given time	not referred	In compliance	

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 35 / 57



Industrie Service

ing)		interval			
Monitoring frequency (re-cording)	Continuously	at a given time interval	Continuously	In compliance (IRL #46)	
Calibration requirements	Included in evaluation by third party validator	not referred	Yearly	In compliance This parameter is required to be monitored for baseline campaign only by AM0034 version 2.	☒ IRL 9j
Uncertainty level	Low	not referred	not referred	±0.025% in the specification	☒
Measurement Principle (if applicable)	Not specified	orifice plate principle	not referred	In compliance Actually orifice & differential pressure transmitter are used.	☒
	Technical aspects				
Instrument Type:	orifice and differential pressure transmitter				☒
Serial Number:	Sasolburg: not identifiable, Secunda: 824567				☒
Manufacturer Model Nr.:	Rosemount 3051, Honeywell ST3000				☒
Specific Location:	On the piping of air supply before NH3 & Air mixer				☒
Measurement Range:	0-160,000 Nm3/hr				☒
Gaps in operating time of instrument :	There has been no gap in operation				☒
	N/A				☒
	N/A				☒
	QA/QC aspects				Conclusion and IRL
Source of data	At Sasolburg, all CDM data are monitored continuously on the DeltaV Distributed Control System				☒

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 36 / 57



Industrie Service

	(DCS) by production personnel in the Control Room. The Instrument Engineer will be responsible for the AMS, data gathering and report generation. Primary data storage is done in a PI database, which form an integral part of the DCS system, at two second intervals. Data are stored in batches of about six days, with only the last five months data continuously available on the DCS. Scheduled backups of the last four batch files are made on a CD every 24 days and stored in a fireproof safe at the Ammonia plant. This data must be restored on the originating PI database before the data can be viewed or interrogated. With the completion of a campaign, data will be transferred from backup CD's to a DVD to minimize space requirements in the fireproof safe. Data are also stored at 30 second intervals in a secondary database which form part of the Sasol Local Area Network and can be viewed from any LAN point. This second database can also be used for reporting should there be a major failure of the primary database At Secunda, all CDM data are monitored continuously on the remote located PC (in the plant control room) via the SCADA INTOUCH and ACTIVE FACTORY software package by production personnel in the Control Room. The PC has access rights to the DAS server computer where the raw data from the instruments is written on a continuous basis. The Area Leader/Manager Maintenance - Engineer will be responsible for the AMS, data gathering and report generation. A daily summary report of hourly average data is generated by the DAS and a unique file is written to the common disk drive (analyzer Z:\) every morning at 05:00AM from where it can be viewed by selected personnel only, in this case the Monitoring Engineer and the Plant production Area leader. This file is safeguarded as read only and cannot be modified or changed as only the third party consultant who developed the DAS and AMS has the password to bypass the safeguarding and access the file for modification. All raw data written to the server hard disk drives, which are setup up using five identical hard disk drives in parallel service is available at any time and can be written to DVD format and forwarded to any party concerned.	IRL #1c IRL #3 IRL #22b
Archiving of raw data and protection measures	As mentioned above all the measured data is archived on the PC. The data archived is periodically backed up in text files in CD-Rs/DVDs	☒
Data transfer and protection of input data for calculations	While there is physical access control to enter the monitoring room where PCs are installed, the personnel who may operate the PCs has been specified as his responsibility. In addition, the data backed up in CD-Rs/DVDs is not editable.	☒
	Quality of evidence	Conclusion

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 37 / 57



Industrie Service

		and IRL
Completeness of data	All applicable hourly data measured during baseline campaign has been submitted in the Excel file. (N/A for project campaigns)	☒ IRL #1a
Data verification	The comparison between the data measured during baseline campaign and the permitted operating range was correctly done. But, this parameter is not required to be monitored during project campaigns.	IRL #1c IRL #14
Crosscheck (if available)	The graphical analysis has been done to check the consistency during the baseline campaign, in addition to the consistency between calculation tool and monitoring report.	☒

Table 6

Parameter and instrumentation Information					
	Meth/Tool	PDD	MR	Verification Findings	Conclusion and IRL
Parameter title	Oxidation temperature for each hour	Oxidation temperature of the AOR	Oxidation temperature of the AOR	In compliance	☒ IRL #1a, IRL #2a, IRL #1c
Parameter ID (if available)	OT _h	OT	OT	In compliance	
Data Unit	°C	°C	°C	In compliance	
Monitoring frequency (reading)	not referred	at a given time interval	not referred	In compliance	
Monitoring frequency (recording)	Every hour	at a given time interval	Every hour	In compliance	
Calibration requirements	Not specified	not referred	Yearly	This parameter is required to be monitored for baseline campaign only by AM0034 version 2.	☒
Uncertainty level	Not specified	not referred	not referred	±1% in the specification.	☒

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 38 / 57



Industrie Service

Measurement Principle (if applicable)	Not specified	thermo-couples	not referred	Thermo-couple type K is used	☒
	Technical aspects				
Instrument Type:	Thermo couples (K-type)				☒
Serial Number:	N/A				N/A
Manufacturer Model Nr.:	Transducer is Endress Hauser iTEMP TMT 181 at Sasolburg and Honeywell ST3000 at Secunda				☒
Specific Location:	3 per AOR				☒
Measurement Range:	0 – 1500 °C				☒
Gaps in operating time of instrument :	There has been no gap in operation				☒
	N/A				☒
	N/A				☒
	QA/QC aspects				Conclusion and IRL
Source of data	At Sasolburg, all CDM data are monitored continuously on the DeltaV Distributed Control System (DCS) by production personnel in the Control Room. The Instrument Engineer will be responsible for the AMS, data gathering and report generation. Primary data storage is done in a PI data-base, which form an integral part of the DCS system, at two second intervals. Data are stored in batches of about six days, with only the last five months data continuously available on the DCS. Scheduled backups of the last four batch files are made on a CD every 24 days and stored in a fireproof safe at the Ammonia plant. This data must be restored on the originating PI database before the data can be viewed or interrogated. With the completion of a campaign, data will be transferred from backup CD's to a DVD to minimize space requirements in the fireproof safe. Data are also stored at 30 second intervals in a secondary database which form part of the Sasol Local Area Network and can be viewed from any LAN point. This second database can also be used for reporting should there be a major failure of the primary database				☒ IRL #1c IRL #3 IRL #22b

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 39 / 57



Industrie Service

	At Secunda, all CDM data are monitored continuously on the remote located PC (in the plant control room) via the SCADA INTOUCH and ACTIVE FACTORY software package by production personnel in the Control Room. The PC has access rights to the DAS server computer where the raw data from the instruments is written on a continuous basis. The Area Leader/Manager Maintenance - Engineer will be responsible for the AMS, data gathering and report generation. A daily summary report of hourly average data is generated by the DAS and a unique file is written to the common disk drive (analyzer Z:\) every morning at 05:00AM from where it can be viewed by selected personnel only, in this case the Monitoring Engineer and the Plant production Area leader. This file is safeguarded as read only and cannot be modified or changed as only the third party consultant who developed the DAS and AMS has the password to bypass the safeguarding and access the file for modification. All raw data written to the server hard disk drives, which are setup up using five identical hard disk drives in parallel service is available at any time and can be written to DVD format and forwarded to any party concerned.	
Archiving of raw data and protection measures	As mentioned above all the measured data is archived on the PC. The data archived is periodically backed up in text files in CD-Rs/DVDs	☒
Data transfer and protection of input data for calculations	While there is physical access control to enter the monitoring room where PCs are installed, the personnel who may operate the PCs has been specified as his responsibility. In addition, the data backed up in CD-Rs/DVDs is not editable.	☒
	Quality of evidence	Conclusion and IRL
Completeness of data	All applicable hourly data measured during baseline campaign has been submitted in the Excel file. (N/A for project campaigns)	☒ IRL #1a IRL #1c IRL #14
Data verification	As stated in the registered PDD, the permitted operating range has been determined based on the historic data at Sasolburg and based on the specification of Uhde at Secunda. And the comparison between the data measured during baseline campaign and the permitted operating range was correctly done. But, this parameter is not required to be monitored during project campaigns.	
Crosscheck (if available)	The graphical analysis was done by the verification team to check if there was any abnormality appeared in the shape of the graph.	☒

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 40 / 57



Industrie Service

Table 7

Parameter and instrumentation Information					
	Meth/Tool	PDD	MR	Verification Findings	Conclusion and IRL
Parameter title	Oxidation Pressure for each hour	Oxidation Pressure of the AOR	Oxidation Pressure of the AOR	In compliance	☒ IRL #1a, IRL #2a, IRL #1c
Parameter ID (if available)	OP _h	OP _h	OP _h	In compliance	
Data Unit	Pa	Bar	bar	The difference of the unit has no impact on the emission reductions since operating conditions during baseline campaign was consistently compared to the permitted range.	
Monitoring frequency (reading)	not referred	Measured every hour	not referred	In compliance	
Monitoring frequency (recording)	Every hour	not referred	every hour	In compliance	
Calibration requirements	Not specified	Critical instruments are calibrated on a routinely basis according to the quality assurance system of the plant (ISO 9000).	Yearly	In compliance This parameter is required to be monitored for baseline campaign only by AM0034 version 2.	☒
Uncertainty level	Not specified	not referred	not referred	±0.025% indicated in the specification..	IRL #21

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 41 / 57



Industrie Service

Measurement Principle (if applicable)	Not specified	Not specified	Not specified	Pressure transducer is used	☒ IRL #1, #2, #3, #45
	Technical aspects				
Instrument Type:	pressure transducer				☒ IRL #0
Serial Number:	Sasolburg: 1526307, Secunda: 0423C2562941007001				☒
Manufacturer Model Nr.:	Rosemount Smart pressure transmitter model 3051 at Sasolburg and Honeywell ST3000 at Secunda				☒
Specific Location:	On the piping between NH3 air mixer and the ammonia oxidation reactor(AOR)				☒
Measurement Range:	0 – 800 psi (0 – 5.52MPa)				☒ IRL #6
Gaps in operating time of instrument :	There has been no gap in operation				☒
	N/A				☒
	N/A				☒
	QA/QC aspects				Conclusion and IRL
Source of data	At Sasolburg, all CDM data are monitored continuously on the DeltaV Distributed Control System (DCS) by production personnel in the Control Room. The Instrument Engineer will be responsible for the AMS, data gathering and report generation. Primary data storage is done in a PI database, which form an integral part of the DCS system, at two second intervals. Data are stored in batches of about six days, with only the last five months data continuously available on the DCS. Scheduled backups of the last four batch files are made on a CD every 24 days and stored in a fireproof safe at the Ammonia plant. This data must be restored on the originating PI database				☒ IRL #1c IRL #3 IRL #22b

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 42 / 57



Industrie Service

	before the data can be viewed or interrogated. With the completion of a campaign, data will be transferred from backup CD's to a DVD to minimize space requirements in the fireproof safe. Data are also stored at 30 second intervals in a secondary database which form part of the Sasol Local Area Network and can be viewed from any LAN point. This second database can also be used for reporting should there be a major failure of the primary database At Secunda, all CDM data are monitored continuously on the remote located PC (in the plant control room) via the SCADA INTOUCH and ACTIVE FACTORY software package by production personnel in the Control Room. The PC has access rights to the DAS server computer where the raw data from the instruments is written on a continuous basis. The Area Leader/Manager Maintenance - Engineer will be responsible for the AMS, data gathering and report generation. A daily summary report of hourly average data is generated by the DAS and a unique file is written to the common disk drive (analyzer Z:\) every morning at 05:00AM from where it can be viewed by selected personnel only, in this case the Monitoring Engineer and the Plant production Area leader. This file is safeguarded as read only and cannot be modified or changed as only the third party consultant who developed the DAS and AMS has the password to bypass the safeguarding and access the file for modification. All raw data written to the server hard disk drives, which are setup up using five identical hard disk drives in parallel service is available at any time and can be written to DVD format and forwarded to any party concerned.	
Archiving of raw data and protection measures	As mentioned above all the measured data is archived on the PC. The data archived is periodically backed up in text files in CD-Rs/DVDs	☒
Data transfer and protection of input data for calculations	While there is physical access control to enter the monitoring room where PCs are installed, the personnel who may operate the PCs has been specified as his responsibility. In addition, the data backed up in CD-Rs/DVDs is not editable.	☒
	Quality of evidence	Conclusion and IRL
Completeness of data	All applicable hourly data measured during baseline campaign has been submitted in the Excel file. (N/A for project campaigns)	☒

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 43 / 57



Industrie Service

Data verification	As stated in the registered PDD, the permitted operating range has been determined based on the specification of the plant. And the comparison between the data measured during baseline campaign and the permitted operating range was correctly done. But, this parameter is not required to be monitored during project campaigns.	IRL #1a IRL #1c IRL #14
Crosscheck (if available)	The graphical analysis was done by the verification team to check if there was any abnormality appeared in the shape of the graph.	☒

2.3. Parameters measured through sampling

Not applicable as the project proponent does not determine the parameters with sampled measurement.

2.4. Parameters obtained through external sources and accounting data

Table 1

Parameter and instrumentation Information					
	Meth/Tool	PDD	MR	Verification Findings	Conclusion and IRL
Parameter title	Gauze supplier Gauze composition	Gauze supplier Gauze composition	Gauze supplier Gauze composition	-	☒ IRL #0,#2
Parameter ID (if available)	GS, GC	GS, GC	GS, GC		
Data Unit	N/A	N/A	N/A	N/A	N/A
Monitoring frequency (reading)	Not specified	N/A	N/A	N/A	N/A
Monitoring frequency (recording)	Each campaign	Recording each campaign	Once for each campaign	In compliance	☒ IRL #0,#2

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 44 / 57



Industrie Service

	QA/QC aspects	Conclusion and IRL
Source of data	Report issued by Heraeus South Africa (IRL #16) GS:W.C.Heraeus / GC: Sasolburg: Pt 54.0 to 56.0 %, Rh 3.6 to 3.9 %, Pd 40.0 to 42.0% and Secunda: Pt 54.0 to 55.0 %, Rh 3.5 to 3.8 %, Pd 41.0 to 43.0 %	☒
Archiving of raw data and protection measures	Filed as purchasing records	☒
Data transfer and protection of input data for calculations	N/A	N/A
	Quality of evidence	Conclusion and IRL
Completeness of data	The complete information was provided.	☒ IRL #1b
Data verification	Both Sasolburg and Secunda continue to use "FTCplus" supplied by W.C. Heraeus from historic campaigns. The gauze composition historically used have been confirmed with the letters namsent from Heraeus in 2006. And the continuation of using the same products have been verified with documents issued by Heraeus SA (PTY) Ltd. every camapigns in which the specifica- tion including the name of the products and the weight % of the platinum, Rhodium and Palladi- um are explicitly indicated.	☒ IRL #1b IRL #16a IRL #16b
Crosscheck (if available)	N/A	N/A

2.5. Other parameters not included in the methodology/tool but included in the PDD

N/A

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 45 / 57



Industrie Service

3. Data Processing and ER calculation

Description of data processing from transferred data to final results in the calculation tool		
Step	Description	Conclusion and IRL
Consistency	All abbreviations and units consistent with the PDD and Methodology and traceable to the raw data	☒ IRL #1a IRL #1c IRL #2a
Calculation Tool description	The way of data processing and calculations are transparently provided and demonstrated comprehensively with the Excel files. The verification team has verified both hourly data and processed data from various point of view, consistency among a series of data, data processing/algorithm incorporated, default/maximum/minimum applied, the compliance to one described in Monitoring Plan as well as to AM0034. And there was neither immediate deficiency nor apparent inconsistency found in the data and the data processing, except the found like <u>Corrective Action Request #5.</u> Sasolburg: In the Excel Calculation Tools spreadsheet "Hourly Average" an incorrect unit for the hourly stack flow was found. Please correct all tools.	☒ IRL #1a IRL #1c IRL #2a
Elimination of not plausible data (if applicable)	Same as above.	<u>CAR #1</u>
Transformation from useable data to input data for further calculation (if applicable)	N/A	N/A

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 46 / 57



Industrie Service

calbe)		
Ex-ante data	N/A	N/A
Default parameter	➤ the conservative IPCC (4.5 kg N₂O/ton nitric acid) specified in the applied methodology ✓ In accordance with AM0034, this value shall be applied to the period of "AMS downtime" during baseline campaign in case, the last measured value is more than this default value ✓ As stated in the verification report for the 1st monitoring period, Sasol recognized considerable drift of N₂O concentration date measured for the 3 month period at the beginning of baseline campaign. And the reason was the vacancy of Span checks due to the availability of "Span gas". ✓ The applicable period were identified as "AMS downtime" and the more conservative value between IPCC default (4.5 kg N₂O/ton nitric acid) or the last measured value was correctly applied. ➤ During project campaign, the highest values (the most conservative values) measured during each entire project campaign were correctly applied for "AMS downtime" in accordance with the applied methodology.	☒ IRL #1a IRL #1b IRL #1c IRL #2a
Formulae check	All formulae included in the calculation tool in compliance with the PDD and methodologies, AM0034. version 2	☒ IRL #1a IRL #1c IRL #2a IRL #14
Rounding functions	Included rounding functions are correctly and conservatively applied.	☒ IRL #14
Calculation tool changes and protection measures	Calculations were done in the spreadsheet as well as in Monitoring Report and those documents were promptly submitted to the verifier to initiate a verification. Any changes on such tool or document were made traceable with the revision date and/or version.	☒ IRL #14
Reported data	As several parameters and calculation results are being corrected, the consistency between the final version of the calculation spreadsheet and the MR has been checked again prior to submitting a verification report.	☒

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 47 / 57



Industrie Service

4. Additional assessment

4.1. Internal Review

Description and performance of internal review		
	Description	Conclusion and IRL
Procedure	There was no specific internal audit for the monitoring activities	N/A
Documentation	N/A	N/A
Responsibilities	N/A	N/A

4.2. Peculiarities

Description of Peculiarities and unexpected Daily Events during the verification period		
	Description	Conclusion and IRL
Performance	<u>Clarification Request #3.</u> Please clarify the low N ₂ O concentration values in May 2009 after starting project campaign #04 in Secunda.	☒
Documentation	See above	☒
Measures	There has been no immediate measure initiated to stabilize the performance of the facility however the operation is gradually being improved.	☒

4.3. Further additional requirements

Description of additional requirements to be checked
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Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 48 / 57



Industrie Service

	Description	Conclusion and IRL
N/A		N/A

4.4. Data Reporting

Description of the Monitoring Report		
	Comments and Results	Conclusion and IRL
Compliance with UNFCCC regulations	The published Monitoring Report was assessed based on the registered PDD and the applied methodology. The verification period is correctly stated in the Monitoring Report. <u>Corrective Action Request #2.</u> According the EB54 Annex34 the calibration frequency and last calibration date for each monitoring instrument shall be reported in the MR. Currently the MR includes the last calibration date before the end of the monitoring period. However, this date is not eligible to show compliance with the calibration frequency. Hence, it is required to state the last calibration date before the start the monitoring period and all dates for calibrations done within the monitoring period. Please correct the MR. <u>Corrective Action Request #3.</u> According the EB54 Annex34 information regarding the actual operation of the project activity during this monitoring period, including information on special events, for example overhaul times, downtimes of equipment, exchange of equipment, etc. shall be reported in the MR in section B.1. Please improve this section in the MR as e.g. there was no information found that would explain the fluctuations of N2O concentration in Secunda especially in project campaign #04. <u>Clarification Request #1.</u> The CDM project is limited to the design capacity (nameplate) of the nitric acid plants. Please clarify the compliance of the CERs generated in this monitoring period and provide a transparent statement in the MR to report this issue. <u>Clarification Request #6.</u>	<u>CAR</u>

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 49 / 57



Industrie Service

	Please provide transparent information on parameters and threshold values defining OH. Currently the MR includes only general information in Chapter D.2. in table "P.4 OH". Please provide individual information for Secunda and Sasolburg and submit appropriate evidences.	
Completeness and Transparency	The assessment verified the completeness and transparency of the data and the information presented in the monitoring report. Following findings were found in the published Monitoring Report.	☒
Correctness	Values from the assessed calculation tool and other relevant sources were correctly transferred to the final Monitoring Report.	☒

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 50 / 57



Industrie Service

5. Compilation and Resolutions of CARs, CRs and FARs

Corrective Action Requests by audit team		
	Comments and Results	Conclusion and IRL
Issue	<u>Corrective Action Request #1.</u> In August 2010 a new QAL 2 has been performed. However, the new QAL2 parameters were not found to be implemented for Sasolburg. Please provide a revised emission reduction calculation tool and a revised MR.	☒ This Finding is closed IRL 9e IRL 14j
Response	Corresponding changes have been made in document "Sasolburg Sixth project campaign- 7May 2010 to 9 Sep 2010- ver 2.0. xls". The MR was updated accordingly.	
Assessment	The audit team reviewed the revised Excel calculation tool "Sasolburg Sixth project campaign- 7May 2010 to 9 Sep 2010- ver 2.0. xls" with special focus on the applied QAL2 parameters. The new QAL 2 parameters were found to be implemented from 16 th of August 2010. The third party institute conducted reference measurement on 16 th of August for N2O analyser and flow meter at Sasolburg. Hence the date is found to be correct. Moreover the applied parameters were also found to consistent with the QAL2 report.	
Issue	<u>Corrective Action Request #2.</u> According the EB54 Annex34 the calibration frequency and last calibration date for each monitoring instrument shall be reported in the MR. Currently the MR includes the last calibration date <u>before the end</u> of the monitoring period. However, this date is not eligible to show compliance with the calibration frequency. Hence, it is required to state the last calibration date <u>before the start</u> the monitoring period and all dates for calibrations done within the monitoring period. Please correct the MR and provide a complete set of all relevant calibration certificates.	☒ This Finding is closed IRL 1e IRL 9a IRL 9d, IRL 9e IRL 9f
Response	The dates of previous calibrations have been added to MR. Revised guidelines for critical instrumentation calibration have been submitted together with copies of certificates for instruments that is critical for the project (AFR and air flow rate, that is used to define plant status and and nitric acid flowmeter	

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 51 / 57



Industrie Service

Corrective Action Requests by audit team		
	to define NAP) . At the same time OT and OP parameters have no effect now on project campaign results and calibration of these parameters is not followed up now in MR. Performance of N2O analyzer and stack gas flow related parameters is controlled during AST and QAL2.	
Assessment	The audit team reviewed the revised MR with special focus on reported calibration dates. <u>NCSG, VSG, TSG, PSG:</u> The exact date for QAL2s and ASTs have to be reported in the MR and for any delay of calibration the EB52 Annex 60 must be followed. In case of delayed AST please clarify (1) the reason of delay and (2) any impact on quality of measurement equipment. <u>AFR and AIFR:</u> Sasolburg: the validity for calibration of 1 year has been exceeded. Hence EB52 Annex 60 must be followed.	
Response	The exact dates of QAL2 and ASTs were included in the latest version of the MR. The corresponding recalculations for NCSG, VSG, TSG, PSG, due to delayed QAL2, have been made in the Excel spreadsheets and values have been updated in the MR. An explanation of the delays between the ASTs has been included in the MR. Those delays did not impact the accuracy of the measurements taken from the relevant instruments, and the ER calculation was not affected by them. Nevertheless, in case of delayed QAL2, the EB52 Annex 60 was applied in emission reduction calculations for the 4th monitoring period, in order to secure conservativeness of approach AFR and AIFR have no influence on emission reduction calculations and are only used to define plant ON/OFF status; moreover all the calibration certificates show proper functioning of the equipments. Based on what was explained, the use of EB52 Annex 60 is not applicable and reasonable in this case.	
Assessment	The verification team reviewed the revised Monitoring Report (IRL 1e) with special focus on the reported calibration dates for NCSG, VSG, TSG, PSG. Exact QAL2 and AST dates are reported for those parameters, Consistency was confirmed by reviewing the relevant QAL2 and AST reports (IRL	

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 52 / 57



Industrie Service

Corrective Action Requests by audit team		
	9a, IRL 9d, IRL 9e and IRL 9f). As QAL2 was performed overdue. Hence PPs applied the procedure determined in EB52 Annex 60 from QAL2 expiring until next QAL2 for NCSG and VSG data. The verifier has reviewed the Excel calculation tool and found the permissible error of VSG and NCSG conservatively applied. As checked by the verifier, applying the permissible error results in a higher EFp than applying the new QAL2 parameters to data in question. Hence the verifier can confirmed that EB 52 Annex 60 is correctly applied. The parameters AFR and AIFR required to determine the baseline emission factor. Hence those measuring equipments have not an impact on the claimed emission reductions.	
Assessment and changes in the MR or related documents – after INCOMPLETE from 09th November 2012	The verifier has reviewed the revised Excel calculation tool (IRL 14u) with special focus on the formula used to apply the permissible error of VSG and NCSG. As checked by the verifier, the mistake in the formula has been corrected and the permissible error of VSG and NCSG is conservatively applied according to EB52 Annex 60 from QAL2 expiring until next QAL2 for NCSG and VSG data. Moreover the values in the revised MR (IRL 1g) were found to be consistent with the Excel calculation tool (IRL 14u).	☒ IRL1g IRL 14u
Issue	<u>Corrective Action Request #3.</u> According the EB54 Annex34 information regarding the actual operation of the project activity during this monitoring period, including information on special events, for example overhaul times, downtimes of equipment, exchange of equipment, etc. shall be reported in the MR in section B.1. Please improve this section in the MR as e.g. there was no information found that would explain the fluctuations of N2O concentration in Secunda especially in project campaign #04.	☒ This Finding is closed IRL 1d
Response	The tables in section B.1 have been improved; the required information has been added.	
Assessment	The audit team reviewed revised MR with special focus on section B.1. Information regarding the actual operation of the project activity during this monitoring period, including information on special events has been included. Additionally the alignment problem of N2O catalyst which was explained to be the reason of increased N2O concentration has been reported here.	

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 53 / 57



Industrie Service

Issue	<u>Corrective Action Request #4.</u> Span checks were found to be out of limit in Secunda in the Shewhart chart but no correction of data was found to be done. Please clarify the procedure which is applied in events when zero or span checks are found to be out of limit and apply this procedure to all such events.	☒ This Finding is closed IRL 14m-p
Response	For periods when Shewhart charts show abnormal deviation of zero and span values the same rule as for periods when weekly checks of zero and span were delayed was applied. The "Guidelines for assessing compliance with the calibration frequency requirements" (EB52) was applied. The corresponding update has been made in document "Secunda_Fourth_Project_Campaign_(4Aug_09_to_31Jan_10)_-ver_3.0. xls"	
Assessment	Please clarify zero QAL3 checks in Secunda (28/06/2009 and 14/09/2009). Please clarify QAL3 correction for Sasolburg because of incorrect zero adjustment: from 02/12/2009 to 28/12/2009, 18/1/2010, 18/03/2010; 09/04/2010; 23/04/2010; 30/04/2010; 01/11/2010 to 09/12/2010.	
Response	EB52 Annex 60 was applied for all this abnormal deviations during zero QAL3 checks both in Secunda and Sasolburg. Corresponding changes were made in Excel spreadsheets and MR.	
Assessment	The verification team reviewed the revised Excel Calculation Tools (IRL 14m-p) with special focus on data handling due to QAL3 out of allowed limits. Hence NCSG values were found to conservatively treated.	

Issue	<u>Corrective Action Request #5.</u> Sasolburg: In the Excel Calculation Tools spreadsheet "Hourly Average" an incorrect unit for the hourly stack flow was found. Please correct all spreadsheets.	☒ This Finding is closed IRL 14m, IRL 14n
Response	The corresponding update has been made in the calculations spreadsheets.	
Assessment	The audit reviewed the the Excel Spreadsheets for Sasolburg with special focus on the unit for stack gas flow in spreadsheet "Hourly Average" The unit is found to be "Ndm3/hr" which is still not correct.	
Response	Corresponding changes have been made on Sasolburg Excel spreadsheets.	

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 54 / 57



Industrie Service

Assessment	The audit reviewed the Excel Spreadsheets for Sasolburg (IRL 14m and IRL 14n) with special focus on the unit for stack gas flow in spreadsheet "Hourly Average". The unit is found to be corrected.	
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Clarification Requests by audit team		
	Comments and Results	Conclusion and IRL
Issue	<u>Clarification Request #1.</u> The CDM project is limited to the design capacity (nameplate) of the nitric acid plants. Please clarify the compliance of the CERs generated in this monitoring period and provide a transparent statement in the MR to report this issue.	☒ This Finding is closed IRL 1d IRL 2i
Response	The latest version of the MR includes a comparison between the nameplate capacity and the actual production for the monitoring period at section E.4.	
Assessment	The audit team reviewed revised MR with special focus on section E.4. A comparison between annual nameplate capacity and production over one year (365 days) were found. The nameplate capacity was verified against the Validation Report "The nameplate capacity for Secunda is 860 t 100% HNO ₃ per day. The value of 290 000 t/year represent 92% operating time at the nameplate capacity. Sasolburg nameplate capacity is 556.8 t 100% HNO ₃ per day. The value of 190 000 t/yr corresponds to 93.4% operating time at nameplate capacity." The nameplate capacity was not exceeded.	

Issue	<u>Clarification Request #2.</u> Sasolburg: Please provide the certificate for test gas used for QAL3 span checks of the analyser in the period 26/08/2009 to 06/12/2010.	☒ This Finding is closed IRL 16d
Response	The certificate has been submitted.	

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 55 / 57



Industrie Service

Assessment	PP submitted the test gas certificate IRL 16d which has been reviewed. The span gas concentration is consistent with the value used in the Shewhart Charts IRL8a.	IRL 8a
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Issue	<u>Clarification Request #3.</u> Please clarify the low N2O concentration values in May 2009 after starting project campaign #04 in Secunda.	☒ This Finding is closed IRL 5c
Response	A new catalyst had been installed before the start of 4 th project campaign in April 2009. Corresponding evidence has been submitted	
Assessment	PPs submitted IRL 5c (Primary and Secondary Catalyst System Installation Report filename: "Sasol Secunda removal&replacement of primary&SC Apr09-CR3.doc" issued by Steve Evenwell (Production Manager) Heraeus dated on 30/04/2009). According to this document new catalyst material was filled before starting project campaign 4. Hence the low N2O concentration became plausible.	

Issue	<u>Clarification Request #4.</u> Secunda: Please clarify calibration procedure for nitric acid flow meter and provide all relevant calibration certificates. Furthermore please clarify the validity of calibration of nitric acid flow meter as the MR states 1 year but different information was gained during onsite interviews. In case the information stated in MR needs to be corrected appropriate evidence must be submitted.	☒ This Finding is closed IRL 7a IRL 9j IRL 9k IRL 9m
Response	The corresponding documents have been submitted. Files with internal procedure regarding calibration frequency have been submitted. The calibration frequency of flow meter for Secunda is 3 years (should be performed during major plant stops)	
Assessment	The verifier reviewed document IRL 7a "Secunda - Critical CDM instrumentation -list of parameters and frequency" including a description of calibration requirement for nitric acid flow meter, which is in compliance with response to CR04. Additionally PPs submitted calibration recommendation from manufacturer (IRL9k) as evidence which has also been reviewed by the verifier. The verifier cross-checked the information with IRL 9j (Calibration Intervals Billing/Monitoring (Suggestions) issued from Endress+Hauser for flowmeters under different conditions). The calibration frequency was found to be in range of the recommendations from Endress+Hauser. A work order (IRL 9l) to confirm an instrument check dated in June 2009 has been provided. Please clarify if the instrument has been calibrated during this check. In case of a delayed calibration EB52 Annex 60 must be followed.	

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 56 / 57



Industrie Service

Response	The nitric acid flow meter had been calibrated during the abovementioned check. The confirmation of that calibration has submitted to the auditor and date of calibration has been corrected in the latest version of MR.	
Assessment	The calibration certificate of nitric acid flow meter serial number C200BD20000 dated on 20/02/2009 was submitted to the verifier (IRL 9m)	

Issue	<u>Clarification Request #5.</u> Secunda and Sasolburg: Please clarify the calibration requirements of AFR flow meter, oxidation temperature and oxidation pressure instrument.	
Response	Files with internal procedure regarding calibration frequency have been submitted.	
Assessment	The verifier reviewed documents IRL 7a "Secunda - Critical CDM instrumentation -list of parameters and frequency" for Secunda and IRL 7b "Sasolburg-Instrument data & descriptions-parameters and frequency" for Sasolburg. The following information regarding calibration requirements for AFR flow meter, oxidation temperature and oxidation pressure instrument were found which are consistent with the reported information in the MR. Hence AFR is calibrated yearly in Sasolburg and every three years in Secunda, OTh and OPh are calibrated yearly in Secunda and Sasolburg.	

Issue	<u>Clarification Request #6.</u> Please provide transparent information on parameters and threshold values defining OH. Currently the MR includes only general information in Chapter D.2. in table "P.4 OH". Please provide individual information for Secunda and Sasolburg.	☒ This Finding is closed IRL 14n
Response	The corresponding clarifications have been added in the MR.	
Assessment	The verifier reviewed revised MR with special focus on Chapter D.2. in table "P.4 OH" and the calculation tools with special focus on OH determination. The information was found to be transparent. Individual values were implemented for Sasolburg and Secunda in the calculation tool. However, the plant status for Sasolburg campaign #06 defined in spreadsheet "Hourly Average" (plant online 4946h) is not consistent with reported OH in spreadsheet "Operating hours and production" (4949h) for Sasolburg campaign #06.	
Response	The amount of operating hours has been corrected accordingly in Excel spreadsheet.	

Verification Protocol

Project Title: "Sasol Nitrous Oxide Abatement Project" – (0961)

Date of Completion: 14-11-2012

Number of Pages: 57 / 57



Industrie Service

Assessment	The verification team reviewed the revised Excel Calculation Tool (IRL 14n). The operating hours for 3 days were found to be corrected in spreadsheet "Operating hours and production".	
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Issue	<u>Clarification Request #7.</u> Secunda: Please provide a statement from nitric acid plant manufacturer on the purpose of the pipe between N2O concentration sample point and stack gas flow sample point as its purpose of emergency bypass of ammonia gas could not be completely evidenced onsite.	☒ This Finding is closed IRL 5d-e
Response	The plant design developer's documentation confirming that this pipe is used as emergency bypass of ammonia gas has been submitted. In addition, the plant scheme shows that if pressure reaches 2200kPa (the set pressure as per attached UDHE technical specification sheet), the ratio controller will attempt to open the ammonia valve to keep ratio at the correct set value. On the other hand, if the ammonia flow is inadequate to maintain the desired ammonia to air flow rate, the ratio tripping mechanism gets activated and the plant will trip.	
Assessment	The verifier reviewed PPs response together with supporting documents (IRL 5d-e). Hence, the documents confirm the purpose of emergency bypass of ammonia gas of the pipe between N2O concentration sample point and stack gas flow sample point.	

Issue	<u>Clarification Request #8.</u> Secunda: Please provide the certificate of test gas used during second half of 5 th project campaign with concentration of 1314ppm according to Shewhart Chart and the certificate of test gas used during first half of 4th campaign with concentration of 1080ppm according to Shewhart Chart.	☒ This Finding is closed IRL 16d IRL 16e IRL 8b IRL 8c
Response	The requested certificates have been submitted	
Assessment	The test gas certificates IRL 16d and IRL 16e which have been reviewed. The span gas concentrations are consistent with the values used in the Shewhart Charts IRL8b and IRL8c.	



Annex 2: Information Reference List

Information Reference List 14-11-2012	Verification of the CDM Project: "Sasol Nitrous Oxide Abatement Project", South Africa (UNFCCC REF-0961)	Page 1 of 11	 Industrie Service
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Ref. No.	Author/Editor / Issuer	Title/Type of Document. Publication place	Issuance and/or submission date(dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
1	MGM / Sasol	<u>Monitoring Report, Project Design Documents, Previous Verification Reports</u> a. PDD (registered), "Sasol Nitrous Oxide Abatement Project", South Africa, dated January 31, 2007 http://cdm.unfccc.int/Projects/DB/DNV-CUK1171877538.97/view b. Verification Report issued at the last verification (2nd PV, CERs have been issued) dated 16 March 2010 c. Monitoring Report, Version 1.0, 09/03/2011 (GSP Version) d. Monitoring Report, Version 2.0, 04/11/2011 e. Monitoring Report, Version 3.0, 10/04/2011 f. Monitoring Report, Version 3.1, 07/07/2012 g. Monitoring Report, Version 3.3, 13/11/2012 (Final version)	Various See the left column.	none
2	UNFCCC	<u>References and requirements at UNFCCC</u> a. Approved baseline and monitoring methodology AM0034: Catalytic reduction of N2O inside the ammonia burner of nitric acid plants, version 02 (EB27) applied to PDD http://cdm.unfccc.int/methodologies/DB/X3KHFURC8891R7AFJZ4DEKTT0W2EF4/view.html b. Clarification to AM0034 (version 02):Catalytic reduction of N2O inside the ammonia burner of nitric acid plant, Annex 12 of EB51 report , clarifying the ways of recalculation of baseline emissions in relation to the campaign length http://cdm.unfccc.int/EB/051/eb51_repan12.pdf c. Guidelines for completing the monitoring report form, version 01 (Annex 34, EB54) http://cdm.unfccc.int/Reference/Guidclarif/iss/iss_guid06_v01.pdf d. Guidelines of completeness check of requests for issuance, version 01,(Annex 68, EB48) report http://cdm.unfccc.int/EB/048/eb48_repan68.pdf e. Guidelines for assessing compliance with the Calibration Frequency Requirements, version 01 (Annex 60, EB52) http://cdm.unfccc.int/EB/052/eb52_repan60.pdf f. Tool to determine the mass flow of a greenhouse gas in a gaseous stream, version 01	Various See the left column.	

Information Reference List 14-11-2012	Verification of the CDM Project: "Sasol Nitrous Oxide Abatement Project", South Africa (UNFCCC REF-0961)	Page 2 of 11	 Industrie Service
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Ref. No.	Author/Editor / Issuer	Title/Type of Document. Publication place	Issuance and/or submission date(dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
		(Annex 10, EB47) http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-08-v1.pdf/history_view g. CDM Glossary http://cdm.unfccc.int/Reference/glossary.html h. CDM Validation and Verification Manual, version 01.2(EB55) http://cdm.unfccc.int/Reference/Manuals/index.html i. Validation Report for the CDM-Project 0961 "Sasol nitrous oxide abatement project" issued by DNV report no. 2007-0195		
3	n/a	Audit participants On-site and on-line interviews conducted on 19-21 April 2011 by TÜV SÜD Verification team: Mr Yutaka Yoshida ATL TÜV SÜD, Japan Mr Martin Hammer GHG V TÜV SÜD, Germany Interviewed persons: Mr.PN Venter Quality Manager Sasol Nitro, South Africa Ms. Melissa Brand CDM Practitioner Sasol Nitro, South Africa Mr TM Mthembu Laboratory Manager Secunda South Africa Mr. B. Nothnagel Technical Assistance Secunda South Africa Mr.MV Skhosana Laboratory Secunda South Africa ca Mr. Fred van Heerden Instruments Sasol Nitro, Sasolburg, South Africa Mr. Sphiwe Mthembu Production Sasol Nitro, Sasolburg, South Africa Mr. Hannes Burger Analysers Sasol Nitro, Sasolburg, South Africa Mr. G. Engels Analysers Sasol Nitro, Sasolburg, South Africa Ms. S. Venter Process Engineering Secunda South Africa Mr. Sergii Kilbus CDM Consultant MGM International	n/a	

Information Reference List 14-11-2012	Verification of the CDM Project: "Sasol Nitrous Oxide Abatement Project", South Africa (UNFCCC REF-0961)	Page 3 of 11	 Industrie Service
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Ref. No.	Author/Editor / Issuer	Title/Type of Document. Publication place	Issuance and/or submission date(dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
5	Sasol	<u>Project Implementation</u> a. "NOX WEEKLY REPORT" in Sasolburg as daily reports in which HNO3 production, N2O amount and the other operational parameters are reported, from Dec. 2007 to November 2010 b. "NA-Plant NOx-CAMP01SEC-CATrev05" in Secunda as daily reports in which HNO3 production, N2O amount and the other operational parameters are reported, from 29/08/2006 to 17/03/2010 c. Primary and Secondary Catalyst System Installation Report filename: "Sasol Secunda removal&replacement of primary&SC Apr09-CR3.doc" issued by Steve Evenwell (Production Manager) Heraeus dated on 30/04/2009 d. Drawing "Stack Tie In" including stack height e. Schematic Drawing No L01622 for project 0769 from Line 8-V-01622-EC31 issued by Uhde GmbH dated on 13/01/1983 f. Piping- Technical Description - Safety valve (UAN 02-0769-602)	Various See the left column.	
6	Sasol, SGS	<u>Monitoring Structure, QA/QC</u> a. Screen shot indicating schematic diagram of the Sasolburg plant in operation b. Screen shot of Secunda control monitor indicating plant in operation c. Algorithm of normalizing stack gas flow data with temperature and pressure data incorporated in DCS at Sasolburg (reviewed onsite) d. Conversion Chart Weight/Concentration of HNO3 being used for the analysis at Sasolburg (reviewed onsite) Example of every 2 seconds data of N2O data recorded on as of the days of the on-site	Various See the left column.	

Information Reference List 14-11-2012	Verification of the CDM Project: "Sasol Nitrous Oxide Abatement Project", South Africa (UNFCCC REF-0961)	Page 4 of 11	 Industrie Service
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Ref. No.	Author/Editor / Issuer	Title/Type of Document. Publication place	Issuance and/or submission date(dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
		visit sAMS calculation for Secunda to determine UCL/LCL of Shewhart chart		
7	Sasol, suppliers	<u>Monitoring Equipment</u> a. "Critical instrumentation equipment – CDM Project Activities list", SECCDM-0010 at Secunda as a part of QMS documents; revision 04; dated on 01/06/2011 b. Excel Sheet "Sasolburg-Instrument data & descriptions-parameters and frequency" c. List of instruments SSBCDM0014 at Sasolburg, as a part of QMS documentsProduct Data Sheet Rosemount3095 Mass Flow Meter for nitric acid produced d. Product Data Sheet for the pressure transmitter installed on the stack gas flowmeter, explaining "real-time fully compensated with temperature and pressure data." e. Sasolburg, Mass ProBar Configuration Certification as a certificate for Air Flow Meter and NH3 Flow Meter, issued by NIC Instruments & Engineering, dated 01 April 2006	Various See the left column.	
8	Sasol	<u>Other Regular Maintenance other than Calibration</u> a. "Shewart Nitro Stats 22-02-11 Sasolburg (2).xls", Shewhart Charts and Zero/Span checks results of all gas components inclusive graphics at Sasolburg plant from 2006 to 2010 b. Shewharts Chart- Secunda-4th Campaign (1), ", Shewhart Charts and Zero/Span checks results of all gas components inclusive graphics at Secunda plant from 05/2009 to 01/2010 c. "Secunda-Shewharts 5th Campaign SPAN & ZERO", Shewhart Charts and Zero/Span checks results of all gas components inclusive graphics at Secunda plant from 02/2010 to 09/2010	Various See the left column.	

Information Reference List 14-11-2012	Verification of the CDM Project: "Sasol Nitrous Oxide Abatement Project", South Africa (UNFCCC REF-0961)	Page 5 of 11	 Industrie Service
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Ref. No.	Author/Editor / Issuer	Title/Type of Document. Publication place	Issuance and/or submission date(dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
g	SGS, Alpret, Endress Hauser, Vaal-Tech Instrumentation	<u>External Calibration</u> - SGS's QAL2 Report, "Validation of N2O Measurements Sasol Nitro Plant in Sasolburg", February 2007 as period investigation - SGS's QAL2 Report, "Validation of N2O Measurements Sasol Nitro Plant in Secunda", February 2007 as period investigation - SGS's AST Report, done on 11 – 12th August 2008 - AST Report issued by SGS Environmental Service for the on-site investigation done in August 2009 at both Sasolburg and Secunda, in which "The overall conclusion is that the instruments that are used in the monitoring system (N2O and Flow) comply with the standard." is mentioned. - SGS's QAL2 Report, "Validation of N2O Measurements Sasol Nitro Plant in Sasolburg", August 2010 as period investigation - SGS's QAL2 Report, "Validation of N2O Measurements Sasol Nitro Plant in Secunda", August 2010 as period investigation - Calibration Certificate for Nitric Acid flowmeter in Sasolburg dated 11/04/2008, 05/08/2009, 23/10/2009, 04/05/2010, 07/12/2010 (transmitter and sensors) calibrated by "Alpret Control Specialis" - Letter from Endress Hauser explaining about no special maintenance such as calibration required for Coriolis type flowmeters (nitric acid) but recommending only appearance inspection. - Nitric Acid mass flow meter calibration certificate issued on Nov. 2007 by Micro Motion - Calibration Intervals Billing/Monitoring (Suggestions) issued from Endress+Hauser for	Various See the left column.	

Information Reference List 14-11-2012	Verification of the CDM Project: "Sasol Nitrous Oxide Abatement Project", South Africa (UNFCCC REF-0961)	Page 6 of 11	 Industrie Service
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Ref. No.	Author/Editor / Issuer	Title/Type of Document. Publication place	Issuance and/or submission date(dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
		flowmeters under different conditions k. Standard Operating Procedure for Calibration and Maintenance Document n°: SOP-A-en-002; Version n°: V01.00.00; Page 4 of 6; © Copyright 2003 - Endress+Hauser Ltd; including recommendations for flowmeters- liquid and flowmeters gas. l. Shut Down Order m. Calibration Certificate for Nitric Acid Flow Meter installed at Secunda Serial Number C200BD20000 issued by Endress + Hauser dated on 20/02/2009		
10	Sasol	<u>Quality of External/Internal Laboratory</u> Example of hand writing records at Sasolburg including HNO3 concentration recorded every 2 hours reviewed during the site visit	Various See the left column.	
13	Sasol	<u>Data Measured and Recorded</u> a. Samples of "Nitric Acid Production Report", dated 11/07/2010, 30/04/2010, 02/04/2010, 07/12/2009, 25/12/2009, 09/11/2009, 11/08/2009, 04/06/2010, in which cumulative raw material input including NH3, HNO3 production, average nitric acid strength, nitric acid tank level, output (fed to Liquid Fertilizers plan) and "Online Time" are indicated at Secunda a. NOX logbook Reports in Excel file "Master NOX logbook Report 22-02-11" as the daily operation log of Sasolburg in which incidents were recorded, e.g. Compressor Failure, Electrical Storm, Lightning trip plant,	Various See the left column.	
14	MGM	<u>Calculation Spreadsheet</u> a. "Sasolburg Baseline Emission Factor rev3.0.xls" , hourly data of all parameters and the determination of baseline emission factor, dated 07/12/2009	Various See the left column.	

Information Reference List 14-11-2012	Verification of the CDM Project: "Sasol Nitrous Oxide Abatement Project", South Africa (UNFCCC REF-0961)	Page 7 of 11	 Industrie Service
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Ref. No.	Author/Editor / Issuer	Title/Type of Document. Publication place	Issuance and/or submission date(dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
		b. "Sasolburg Fifth project campaign- ver 1.0" , hourly data of all parameters and the determination of 5th project emission factor as well as the amount of ERs, dated 25/01/2011 c. "Sasolburg EFBL- recalculation for Sixth project campaign.ver 1.0" hourly data of all parameters and the determination of baseline emission factor, dated 18/01/2011 d. "Sasolburg Sixth project campaign (7 May 10 to 9 Sep 10)-ver 1.0" , hourly data of all parameters and the determination of 6 th project emission factor as well as the amount of ERs, dated 25/01/2011 e. "Secunda Baseline Emission Factor Calculation 15 April 08.xls" , hourly data of all parameters and the determination of baseline emission factor, f. "Secunda Fourth Project Campaign (4 Aug 09 to 31 Jan 10) -ver 1.0" , hourly data of all parameters and the determination of 4th project emission factor as well as the amount of ERs, dated 18/01/2011 g. "Secunda EFBL- recalculation for fifth project campaign- ver 1.0" , hourly data of all parameters and the determination of baseline emission factor, dated 18/01/2011 h. "Secunda Fifth Project Campaign -ver 1.0" , hourly data of all parameters and the determination of 3rd project emission factor as well as the amount of ERs i. "Sasolburg Fifth project campaign - ver 2.0-" hourly data of all parameters and the determination of 5th project emission factor as well as the amount of ERs, dated 21/09/2011 j. "Sasolburg Sixth project campaign- 7May 2010 to 9 Sep 2010- ver 2.0-" hourly data of all parameters and the determination of 6 th project emission factor as well as the amount of ERs, dated 21/09/2011		

Information Reference List 14-11-2012	Verification of the CDM Project: "Sasol Nitrous Oxide Abatement Project", South Africa (UNFCCC REF-0961)	Page 8 of 11	 Industrie Service
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Ref. No.	Author/Editor / Issuer	Title/Type of Document. Publication place	Issuance and/or submission date(dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
		k. "Secunda_Fourth_Project_Campaign_(4Aug_09_to_31Jan_10)_-ver_3.0" hourly data of all parameters and the determination of 4th project emission factor as well as the amount of ERs, dated 22/08/2011 l. "Secunda Fifth Project Campaign - ver 2.0" hourly data of all parameters and the determination of 4th project emission factor as well as the amount of ERs, dated 16/09/2011 m. "Sasolburg Fifth project campaign - ver 3.0-" hourly data of all parameters and the determination of 5th project emission factor as well as the amount of ERs, dated 04/04/2012 n. "Sasolburg Sixth project campaign- 7May 2010 to 9 Sep 2010- ver 3.0-" hourly data of all parameters and the determination of 6 th project emission factor as well as the amount of ERs, dated 04/04/2012 o. "Secunda_Fourth_Project_Campaign_(4Aug_09_to_31Jan_10)_-ver_4.0" hourly data of all parameters and the determination of 4th project emission factor as well as the amount of ERs, dated 04/04/2012 p. "Secunda Fifth Project Campaign - ver 3.0" hourly data of all parameters and the determination of 4th project emission factor as well as the amount of ERs, dated 04/04/2012 q. "Sasolburg Fifth project campaign - ver 3.1-" hourly data of all parameters and the determination of 5th project emission factor as well as the amount of ERs, dated 07/07/2012 r. "Sasolburg Sixth project campaign- 7May 2010 to 9 Sep 2010- ver 3.1-" hourly data of all parameters and the determination of 6 th project emission factor as well as the amount of		

Information Reference List 14-11-2012	Verification of the CDM Project: “Sasol Nitrous Oxide Abatement Project”, South Africa (UNFCCC REF-0961)	Page 9 of 11	 Industrie Service
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Ref. No.	Author/Editor / Issuer	Title/Type of Document. Publication place	Issuance and/or submission date(dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
		ERs, dated 07/07/2012 s. “Secunda_Fourth_Project_Campaign_(4Aug_09_to_31Jan_10)_-ver_4.1” hourly data of all parameters and the determination of 4th project emission factor as well as the amount of ERs, dated 07/07/2012 t. “Secunda Fifth Project Campaign - ver 3.1” hourly data of all parameters and the determination of 4th project emission factor as well as the amount of ERs, dated 07/07/2012 u. “Sasolburg Sixth project campaign- 7May 2010 to 9 Sep 2010- ver 3.3-“ hourly data of all parameters and the determination of 6 th project emission factor as well as the amount of ERs, dated 13/11/2012		
15	Sasol	<u>Cross-Checking</u> a. Refer to IRL 5a b. Cross checking result of the amount of nitric acid produced at Secunda from February 2008 to September 2010, including monthly comparison between mass balance data and meter reading (flow meter measurement) “Monthly CDM Mass Balance”	Various See the left column.	
16	Heraeus South Africa, AIR LIQUIDE, AFROX	<u>Other External Data, Records</u> a. “Fixed rate for 21st FTCPlus campaign” issued by Heraeus South Africa dated 4 November 2011 for 21st Campaign (for the campaign starting December 2010) added to the previous 10 campaigns since 10th campaign started January 2004 as the evidence of Gauze composition and supplier in Sasolburg, as well as the historic nitric acid production per campaign in Sasolburg b. Letter from Heraeus dated on 24/03/2011 – confirming no change in gauze composition and gauze supplier for Secunda	Various See the left column.	

Information Reference List 14-11-2012	Verification of the CDM Project: "Sasol Nitrous Oxide Abatement Project", South Africa (UNFCCC REF-0961)	Page 10 of 11	 Industrie Service
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Ref. No.	Author/Editor / Issuer	Title/Type of Document. Publication place	Issuance and/or submission date(dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
		c. Certificate label on the cylinder of reference gas previously used at Sasolburg for Span check issued by MATHESON TRI GAS, analyzed at 402.6 ppmv, filled on 19-05-09 expires on 20-05-12 d. Span gas certificate for test gas 1087 ppm N ₂ O used at Secunda for Span check, issued by Air Liquide, analyzed at 1087 ppmv, filled on 15-07-09 expires on 15-07-10 e. Span gas certificate for test gas 1314 ppm N ₂ O used at Secunda for Span check, issued by AFROX, analyzed at 1314 ppmv, filled on 02-08-10 expires on 02-08-12 f. International Fachzeitschrift Metall 06/208.		
18	Sasol, Uhde, Heraeus	<u>Applicability Conditions</u> a. The letter titled as "Re:Notes on 1973 design and test run data, Sasol HNO ₃ plant in Sasolburg, South Africa" dated 13 September 2006, providing the plant capacity data including old record as attachment made by Uhde, saying 522 ton 100% per day as the designed guaranteed minimum capacity and 556.8 ton 100% per day as demonstrated capacity in November 1973 b. For Secunda, the latest certificate with regard to atmospheric pollution, "Registration in terms of the Atmospheric Pollution Prevention ACT, 1965(ACT 45 of 1965)" dated on 04.Jan 1999 for the nitric acid processes is stating 860 t 100%HNO ₃ /d	Various See the left column.	
19	Sasol, Uhde	<u>Baseline, Historic Data</u> a. Fax from Uhde dated on 23 Jan 2008 to justify the range of OT _{normal} 860-920 written in PDD for Secunda, saying that higher than 890 improves efficiency but also increase platinum losses, and that lower than 860 reduces efficiency drastically. b. Historic hourly oxidization temperature at Sasolburg in the spreadsheet, used to determine permitted operating condition.	Various See the left column.	

Information Reference List 14-11-2012	Verification of the CDM Project: "Sasol Nitrous Oxide Abatement Project", South Africa (UNFCCC REF-0961)	Page 11 of 11	 Industrie Service
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Ref. No.	Author/Editor / Issuer	Title/Type of Document. Publication place	Issuance and/or submission date(dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
21	Department of Environmental Affairs and Tourism	<u>Environment, Legislative Conformance</u> a. Operation Permit of Nitric Acid plant at Sasolburg with regard to Atmospheric Air Pollution Prevention Act, 1965 issued by Department of Environmental Affairs and Tourism, issued on 28 th December 2004 b. "Registration in terms of the Atmospheric Pollution Prevention ACT, 1965(ACT 45 of 1965)" dated on 18.Feb 2002 issued by Department of Environmental Affairs and Tourism	Various See the left column.	
22	Sasol	<u>QA/QC in general</u> a. ISO 9001 : 2008 Certificate issued by DQS GmbH for Sasol Nitro Sasolburg valid until 30/11/2012 b. QMS Documents prepared specifically for CDM activities including Overview Project Management, Responsibilities and document control procedures, List of measuring equipment and calibration frequencies, etc. for both Sasolburg and Secunda	Various See the left column.	



Annex 3: Appointment Certificates



Industrie Service

CERTIFICATE OF APPOINTMENT

Mr Yoshida, Yutaka, fulfills the requirements of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH to participate in audits.

Qualification applicable to						
Standard	CDM	JI	GS	VCS	VER	Other
Date	25.03.11					

Qualification as						
Status	Trainee	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date		25.03.11	25.03.11	25.03.11		

Other qualification					
Country Expertise					
Region	1	2	3	4	5
Date	25.03.11				
Financial Expertise					
Date					

Qualification in technical areas	
Technical Area	Date
3.1_Energy demand	25.03.11
5.1_4.9_11.1_12.1_Chemical process industries	25.03.11
11.2_GHG capture and destruction	25.03.11
1.1_4.10_Thermal energy generation...	12.10.11
1.2_Energy generation from renewable energy source	12.10.11
13.1_Waste handling and disposal	12.10.11
2.1_Electricity distribution	12.10.11

This appointment is valid for 1 year from its date of signature below and is bound by internal requirements of the Management System of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH.

In case of loss of validity of this certificate as per result of an assessment according internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference No. CMS-Z-0026/03.

Date	Signature
25.03.12 Extension of Validity	



Industrie Service

CERTIFICATE OF APPOINTMENT

Mr Hammer, Martin, fulfills the requirements of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH to participate in audits.

Qualification applicable to						
Standard	CDM	JI	GS	VCS	VER	Other
Date	23.03.11					

Qualification as						
Status	Trainee	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date		23.03.11	23.03.11	23.03.11		

Other qualification					
Country Expertise					
Region	1	2	3	4	5
Date	23.03.11				
Financial Expertise					
Date	23.03.11				

Qualification in technical areas	
Technical Area	Date
1.2_Energy generation from renewable energy source	23.03.11
5.1_4.9_11.1_12.1_Chemical process industries	23.03.11

This appointment is valid for 1 year from its date of signature below and is bound by internal requirements of the Management System of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH.

In case of loss of validity of this certificate as per result of an assessment according internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference No. CMS-Z-0005/02.

Date	Signature
23.03.12 Extension of Validity	



Industrie Service

CERTIFICATE OF APPOINTMENT

Mr Castro, Javier, fulfills the requirements of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH to participate in audits.

Qualification applicable to						
Standard	CDM	JI	GS	VCS	VER	Other
Date	22.03.11					

Qualification as						
Status	Trainee	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date		22.03.11	22.03.11	22.03.11	22.03.11	

Other qualification					
Country Expertise					
Region	1	2	3	4	5
Date	22.03.11	22.03.11			
Financial Expertise					
Date	22.03.11				

Qualification in technical areas	
Technical Area	Date
1.2_Energy generation from renewable energy source	22.03.11
5.1_4.9_11.1_12.1_Chemical process industries	22.03.11
13.1_Waste handling and disposal	22.03.11
13.2_15.2_Animal waste management	22.03.11

This appointment is valid for 1 year from its date of signature below and is bound by internal requirements of the Management System of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH.

In case of loss of validity of this certificate as per result of an assessment according internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference No. CMS-Z-0003/02.

Date	Signature
22.03.12 Extension of Validity	<i>Thomas Klier</i>